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Comparison of Pregabalin and Tramadol for Post-operative Pain Management in Patients Undergoing Lumbar Laminectomy

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Abstract

Introduction: Prevention and treatment of post-operative pain continue to be a major challenge in post-operative care. Opioid analgesics, with their well-known side effects, continue to represent a cornerstone in post-operative pain control.

Aim: Aim of this study is to assess and compare the efficacy and safety of pre-operative administration of pregabalin and tramadol in patients undergoing elective lumbar laminectomy.

Materials and Methods: Group 1 was received a placebo capsule orally 1 h before anesthetic induction. Group 2 was received a tramadol capsule 100 mg orally 1 h before anesthetic induction. Group 3 was received a pregabalin capsule 150 mg 1 h before anesthetic induction.

Results: The pain scores in Group 2 are less than Groups 1 and 2 preoperatively, after extubation and 1, 2, 4 and 6 h postoperatively, and this difference is significant (P < 0.05). The sedation score in Group 2 is greater than that of Group 3 which is greater than that of Group 1 preoperatively, after extubation and 1, 2, 4 and 6 h post-operatively. Fentanyl requirement is more in Group 1 compared to Group 3, which itself is more than Group 2. These differences are statistically significant. Adverse effects such as nausea, vomiting, and drowsiness are less than that of Groups 1 and 2.

Conclusion: Pregabalin has a statistically significant effect when compared to placebo, but this effect is less when compared to tramadol. The need for rescue analgesia is in the least in tramadol patients followed by pregabalin, and it increases maximum in the placebo group.

Key words: Lumbar laminectomy, Post-operative pain, Pregabalin, Tramadol

INTRODUCTION

Post-operative pain is one of the most feared problems among patients coming for surgery. Post-operative pain management includes pain management, prevention, and treatment of post-operative complications and restoring pre-operative function.¹² Prevention and treatment of post-operative pain still remain a major challenge in post-operative care despite significant advancements in pain assessment and therapy.³ By early mobilization of the patient, it improves his or her well-being. It has been reported that roughly 80% of patients undergoing surgical procedures experience post-operative pain. Post-operative pain at rest is responsive to opioids.⁴ However, movement-evoked pain is considerably less responsive and is related to post-operative pulmonary, cardiac, and thromboembolic complications.⁵ The guidelines for post-operative pain treatment have been revised, and drugs such as S-ketamine, pregabalin, metamizole, and oxycodone are used as new methods of preventing post-operative pain. Prolonged chronic pain after surgery has been under recognized until recently which is actually a very common phenomenon. A number of risk factors and predictors including the age, gender, surgical procedure, pre- and post-operative pain, genes, psychosocial factors,
and pain modulation variables have been identified. Together with increased knowledge about the pathophysiology of chronic pain after surgery, it may be possible to develop successful drugs and interventions in the near future. Post-surgical pain is normally perceived as nociceptive pain. Surgical trauma causes central and peripheral sensitization and hyperalgesia which when untreated can lead to chronic post-operative pain after surgery. Indeed pain is one among the three most common causes of delayed discharge after ambulatory surgery next to drowsiness and nausea/vomiting. Antihyperalgesic drugs improve the post-operative pain by preventing the development of central sensitization. The recent advance in post-operative pain management includes finding exact molecular mechanisms, new drugs and other routes and modes of analgesic delivery. For years opioids have been the cornerstone of post-operative pain management in spite of their side effects. Hence, the search for newer analgesics and combination of analgesics and other non-opioid drugs continues to improve post-operative analgesia and reduce opioid-related side effects.

In this context, the gabapentinoids (gabapentin and pregabalin) have been targeted by the researchers. The early success in the treatment of trigeminal neuralgia with gabapentinoids has led to many studies that have assessed their analgesic potency in treating neuropathic pain associated with diabetic peripheral neuropathy and postherpetic neuralgia. Furthermore, their analgesic efficacy after a variety of surgical procedures has also been studied. This study was thus taken up to test the hypothesis of the utility of pregabalin for the relief of post-operative pain in lumbar laminectomy.

**Aim**

The primary outcome of the study was to measure the analgesic and anxiolytic efficacy of pregabalin and tramadol for post-operative pain while the secondary outcome was to assess the adverse effects of these drugs.

**RESULTS**

The study was conducted in 75 patients of either sexes in the age group of 20-60 years, belonging to ASA class - 1 and SA class - 2, undergoing elective lumbar laminectomy under general anesthesia. The mean age of patients in Group 1 is 44.04 with a standard deviation (SD) of 7.44 and in Group 2 the mean age are 44.12 with a SD of 8.52 and in Group 3 the mean age is 45.96 with a SD of 8.5. The P-value is 0.645, which is insignificant. The mean weight of the patients in Group 1 is 56.44 with a SD of 7.19 and in Group 2 are 57.44 with a SD of 7.49 and in Group 3 are 56.88 with a SD of 6.18. The P-value is found to be 0.828 which is not significant. Therefore, the three groups are comparable in their weight. The mean height of patients in Groups 1, 2, and 3 are 1.56, 1.57, and 1.59 with a SD of 0.07, 0.07, and 0.09, respectively. The P-value is found to be 0.404 which is not significant. This implies that there is no significant difference in height among the three groups and they are comparable. The mean BMI among Groups 1, 2, and 3 are 23.35, 23.20, and 22.53 with a SD of 1.74, 2.04, and 1.14, respectively. The P = 0.192 which is not significant. Therefore, the BMI is comparable among all three groups. The sex ratio (male:female) among Groups 1, 2, and 3 are 8:17, 9:16, and 8:17, respectively. The P-value is found to be 0.942 which is not significant. The ASA class 1:2 ratios among three Groups 1, 2, and 3 are 13:12, 13:12, and 12:13, respectively. The P-value is found to be 0.948 which is not significant. The mean duration of surgery in minutes among Groups 1, 2, and 3 are 148 ± 15, 148.80 ± 11.3, and 146.40 ± 17.29, respectively. The P-value is found to be 0.63
which is insignificant. The spinal levels of laminectomy (1:2) in Groups 1, 2, and 3 are 12:13, 11:14, and 13:12, respectively, with a P value of 0.852 which shows that the groups are comparable. No significant difference was observed in the heart rate and respiratory rate recorded preoperatively (1 and 5 min after intubation), immediately after extubation (1, 2, 4, and 6 h post-operatively) among the groups (P > 0.05). Similarly, no significant difference was observed in the mean systolic and diastolic blood pressures preoperatively, 1 min after intubation, as well as 1, 2, 4, and 6 h postoperatively among all the three groups.

Significant differences were observed in the pain scores of all three groups preoperatively and after extubation and at 1, 2, 4, and 6 h postoperatively, a significant decrease in the pain scores of the patients who received tramadol and pregabalin in comparison to the placebo group was noted (P < 0.05) (Table 1).

The mean anxiety scores in Group 2 are less than Group 3 which is less than Group 1, and this difference is statistically significant. The mean anxiety scores in Group 2 is less than that of Group 1 preoperatively, after extubation and 1, 2, 4 and 6 h after extubation. The mean anxiety score in Group 3 is lesser than that of Group 1. The mean anxiety scores in Group 3 are less than that of Group 1 (Table 2).

The sedation score in Group 2 is greater than that of Group 3 which is greater than that of Group 1 preoperatively, after extubation and 1, 2, 4 and 6 h postoperatively. The sedation scores are greater in Group 2 than in Group 1 with a significant difference in all time intervals. The sedation score is greater in Group 3 is significantly greater than Group 2 in all time intervals. The mean sedation score in Group 2 is significantly greater than Group 2 in all time intervals. The mean sedation score in Group 2 is significantly greater than that of Group 3 preoperatively and 2, 4 and 6 h postoperatively. Immediately after extubation and 1 h after extubation sedation score in Group 3 is comparable to that of Group 2 (Table 3).

The mean fentanyl requirement in Group 1 is 128 ± 17.40, in Group 2 is 40.40 ± 9.17 and in Group 3 it is 60.40 ± 17.29. Fentanyl requirement is more in Group 1 compared to Group 3, which itself is more than Group 2. These differences are statistically significant (Table 4). Adverse effects such as nausea, vomiting, and drowsiness are less than that of Groups 1 and 2 (Table 5).

**DISCUSSION**

In this study, the pain scores of the patients who received tramadol and pregabalin were significantly decreased in comparison to placebo group. The tramadol group had the least pain scores when compared to the pregabalin and placebo groups.

It was also observed that the analgesia provided by tramadol was superior to that of pregabalin, but pregabalin was more...
effective in reducing the pain when compared to placebo. In study done by Kumar et al., pregabalin showed statistically significant analgesic effects compared to placebo, but the effect was found to be less prevalent compared to tramadol. Pain scores were low at all time intervals in the tramadol group. The need for rescue analgesia was the least prevalent in tramadol patients.5

Drowsiness was less frequent in the pregabalin group (4%) compared to the tramadol group (32%). Fewer patients had nausea (4%) and vomiting (4%) with pregabalin when compared to placebo (nausea 8%, vomiting 12%) and tramadol (nausea 20%, vomiting 20%). This implies that the incidence of nausea and vomiting is more with tramadol and placebo than with pregabalin. In study done by Farzi et al., nausea, vomiting and sedation, in the tramadol group, were higher than gabapentin group. The trends of reduction in pain score similar with both drugs.8

The amount of rescue analgesia required was more in control group, and hence the total dose of fentanyl given during the first 6 h of the post-operative period was relatively more when compared to tramadol and pregabalin groups. In study done by Kumar et al., the patients in the tramadol group required significantly less rescue analgesia than the pregabalin patients.5

In this study, the anxiety scores in pregabalin and tramadol groups were significantly lower when compared to the placebo group. However, the anxiety scores were significantly lower in the pregabalin group in comparison to the placebo group, whereas it is significantly higher than the tramadol group. This observation shows that pregabalin also has an anxiolytic effect additionally although it is to a lesser extent when compared to tramadol.9,10

The pre-operative sedation scores in my study were significantly greater in tramadol group when compared to the pregabalin and placebo groups. After extubation and postoperatively, the level of sedation increased in both pregabalin and tramadol. However, this increase in sedation in pregabalin group was more after extubation and 1 h postoperatively (but less than tramadol insignificantly); rest all time intervals, it was significantly lower than the tramadol group though the sedation was significantly higher than the placebo group. From this, we infer that pregabalin has a good anxiolytic effect without resulting in excessive sedation.

In my study, the increase in heart rate is significantly lower in tramadol group while compared to placebo at 1 and 3 min after intubation and at 30, 60 and 120 min and after extubation. The decrease in heart rate is insignificant pre-operatively and 5 min after intubation. Similarly, in the pregabalin group, the increase in heart rate is significantly lower at 1 and 3 min after intubation, at 30, 60 and 120 min and after extubation when compared to placebo group.11

CONCLUSION

Pregabalin has a statistically significant effect when compared to placebo, but this effect is less when compared to tramadol. The need for rescue analgesia is in the least in tramadol patients followed by pregabalin and it increases maximum in the placebo group. Pregabalin has a statistically significant anxiolytic effect when compared to the placebo group. The anxiolytic effect of pregabalin is associated with less sedation when compared to that of tramadol. Pregabalin has the lowest number of post-operative complications such as nausea, vomiting, and drowsiness when compared to tramadol.

REFERENCES


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Clinical, Endoscopic and Histopathological Study of Helicobacter pylori Related Gastritis in Adults Tertiary Care Teaching Hospital

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Abstract

Introduction: Helicobacter pylori are major etiological factor in the development of peptic ulcer disease.

Aim and Objective: To find out the association of H. pylori with gastric lesions in endoscopic biopsy specimen in semi-urban regions, and to study the specificity and sensitivity of rapid urease test (RUT), to evaluate the usefulness of Giemsa stain in addition to histopathological examination for identification of H. pylori.

Materials and Methods: A prospective study of 50 adult patients presenting with upper abdominal pain, dyspepsia, vomiting, and hematemesis is undertaken to evaluate the relationship of this symptom complex to inflammatory gastroduodenal lesions with special reference to H. pylori infection. The clinical, endoscopic findings, RUT and histopathological evaluation of gastric antral specimen with special stains to demonstrate the organism are presented and analyzed.

Key words: Gastritis, Helicobacter pylori, Rapid urease test, Upper gastrointestinal endoscopy

INTRODUCTION

The understanding of etiopathogenesis of peptic ulcer, expressed as gastritis, gastric ulcer, duodenitis, and duodenal ulcer has been revolutionized during last decade with the discovery in 1983, of a new pathogen categorized as Helicobacter pylori by Marshall and Warren.¹² Several reports have subsequently supported the association of H. pylori as a major etiological factor in the development of peptic ulcer disease³ and recent reports also suggest its association with gastric carcinoma and lymphoma.⁴ Bacterium has been classified as Class I definite gastric carcinogen to human.¹⁹ A prospective study of adult presenting with upper abdominal pain, dyspepsia, vomiting, and hematemesis is undertaken to evaluate the relationship of this symptom complex to inflammatory gastroduodenal lesions with special reference to H. pylori infection. The clinical, endoscopic findings, rapid urease test (RUT) and histopathological evaluation of gastric antral specimen with special stains to demonstrate the organism are presented and analyzed.

In addition to more common inflammatory cell infiltration it is only recently the histopathologic effect of H. pylori on gastric epithelium at light microscopic level has been stressed and this has been studied systematically, describing striking changes in surface epithelium and attributing them as specific for H. pylori colonization and correlating them with type of cytotoxin, production and risk of peptic ulcer.⁵ H. pylori infection can be diagnosed by invasive⁶ (requiring endoscopy) and non-invasive technique.⁶

In this study, the various methods of identification of H. pylori and histopathological features associated H. pylori in gastric mucosa in patients, presenting with dyspepsia are discussed in detail.

MATERIALS AND METHODS

In this study, endoscopic biopsies were taken from 50 patients, who attended gastroenterology department
with complaints of nausea, vomiting, dyspepsia, flatulence, and fullness were screened with detailed clinical history regarding socioeconomics status, housing conditions, water supply, etc. After thorough clinical evaluation, patients suspected to have gastric lesions were subjected to the endoscopic biopsy procedure.

**Methodology**  
**Endoscopy**  
Upper gastrointestinal endoscopy was performed with flexible fiber optic endoscope manufactured by Pentax model number 29P.  
- Informed consent was obtained from patients. Relevant history and clinical details were recorded  
- After overnight fasting, endoscopy was done on the following morning, endoscopic changes were noted in esophagus, stomach, and duodenum was recorded  
- Three gastric biopsy specimens were taken from antrum and corpus, and one was immediately used for RUT (Annexure 1), and the other was immediately fixed in 10% buffered neutral formalin for histopathological evaluation.

**Histopathologic Study of Biopsy Specimens**  
The biopsy specimens that were fixed in 10% buffered neutral formalin were processed in automatic tissue processor for paraffin embedding, and then 3-5 µ sections were cut. The sections were stained with hematoxylin and eosin (H and E) (Annexure II) for evaluation of histopathological features and special stains such as Giemsa and Alcian blue/periodic acid–Schiff stain (Annexure III) used to detect *H. pylori* organisms.

Gastritis was defined and classified according to established histological criteria with revised updated Sydney system.

The density of *H. pylori*, chronic inflammation, neutrophil polymorphic activity, glandular atrophy, and intestinal metaplasia was recorded in all cases of gastritis and graded as mild, moderate and marked scale according to the guidelines provided by the updated, revised Sydney system, using the visual analog scale. The most prevalent appearance on each slide was matched with the graded panel that resembles it most closely. Lesion being active was signified by the presence of neutrophils within glandular and surface epithelial layer. Glandular atrophy was identified, when gastric glands were correspondingly decreased in amount and widely separated. An increase in lymphocytes and plasma cells in lamina propria categorizes the gastritis as chronic. Infiltration involving up to 1/3 of gastric pits and surface are designated as mild between 1/2 and 2/3 as moderate as and more than this as severe gastritis.

Apart from graded variables described in the updated, revised Sydney system, special attention has been thrown on non-graded variables such as surface epithelial changes, mucin depletion, erosions, lymphoid follicles, cells drop out, foveolar hyperplasia, pseudopyloric metaplasia, and endocrine hyperplasia.

**OBSERVATIONS AND RESULTS**

This study covered 50 patients clinically suspected to have gastritis and undergone upper gastrointestinal endoscopy. In the 50 cases, 35 were males with age ranging from 20 to 70 years (mean age 45 years) 15 were females with age ranging from 20 to 60 years (mean age 40 years).

When the patients were divided into six groups according to their age (<20, 21-30, 31-40, 41-50, 51-60, and 61-70), there was a significant increase in the *H. pylori* positivity in the age group of 41-50 years (53.8%) followed by 31-40 years (50.0%) (Figure 1 and Table 1).

Abdominal pain with dyspepsia more than 3 months is the most common clinical presentation followed by abdominal discomfort with vomiting and nausea. Abdominal discomfort with anemia was noticed in some cases.

![Table 1: Age/percentage distribution](image)
The clinical presentations of the patients are summarized in Figure 2 and Table 2.

**Endoscopic Examination**

Upper gastrointestinal endoscopy revealed 12 cases showed gastric ulcer ranging from 0.5 to 2 cm with erosion and edema; 12 cases antral gastritis with duodenal ulcer; 5 cases showed nodularity of gastric mucosa; 6 cases with patchy erythematous gastric mucosa; 5 cases were with duodenal erosion and edema with ulceration ranging from 0.25 cm × 1 cm to 1.5 cm × 3 cm and 10 patients did not show any endoscopically detected lesion.

Endoscopic findings in all the 50 cases (Table 3).

Endoscopic findings and corresponding histopathologic diagnosis of 50 endoscopic biopsies are listed in Table 4.

In 10 cases, where endoscopy was normal, there was histological evidence of chronic active gastritis in one case and mild gastritis in one case and eight cases shows normal gastric mucosa. These shows an apparent lack of correlation between endoscopic and histopathological diagnosis of gastritis in dyspeptic patients.

**RUT**

RUT for detection of *H. pylori* from endoscopic specimen. The biopsy specimen was subjected to urease testing in 50 cases, of which there were 24 positive cases. Among the 24 urease positive cases, 22 cases were detected histopathologically for *H. pylori*.

In the 26 urease negative gastritis biopsy, Giemsa staining also did not detect *H. pylori*.

RUT is a simple, cheap test, performed at endoscopy room itself using Heli-check test device. It contains urea solution with an indicator that detects alkalinity resulting from formation of ammonia in most infected patients (70%) and gives a positive result within 2 h. In cases of a positive result, it shows a change in color from yellow/orange to pink/red. Whereas, in cases of a negative result, the color remains as yellow color itself. Urease test detects up to 0.3 unit of urease present in the sample.

**Limitations of This Test**

1. The test is pH sensitive, and therefore, any contamination in the reaction wells will change the reaction
2. Biopsy specimen collected in preservatives with acidic or basic pH such as formalin should not be used for Heli-Check RUT test device.

**Demonstration of *H. pylori* by Giemsa Stain**

Although the *H. pylori* organisms were visible in the H and E stain, demonstration by Giemsa stain is considered as the gold standard for *H. pylori* detection. It facilitates the identification of *H. pylori* by darkening the organism.

Using Giemsa stain, the spiral-shaped bacteria of *H. pylori* is attached to brush borders of gastric foveolar cells and inside the gastric pits. The distribution was mostly patchy and single. Lying close to surface epithelium and more densely distributed within the lumen of gastric pits. The organisms are absent in the areas of intestinal metaplasia.

In this study, *H. pylori* were demonstrated using Giemsa stain in 22 out of 50 biopsies.

**Association between Gastritis and Presence of *H. pylori***

Most of the biopsy specimen, which was positive for *H. pylori* showed histological evidence of gastritis.
A total of 24 cases showed chronic active antral gastritis and activity implying the presence of a high number of neutrophilic polymorphs in the lamina propria and within the epithelium.

**Relationship between H. pylori Density and Severity of Gastritis**

There was no correlation between the degree of inflammation, noted in the histopathologic study and density of *H. pylori* organisms.

**Histopathology of Gastric Antral Biopsies**

Table 5 shows details of histopathological findings of all the 50 gastric biopsies. Out of the 50 cases, only 22 cases show gastritis with *H. pylori* positive.

The presence or absence of *H. pylori* with varying degree of chronic inflammation, neutrophilic polymorphic activity, glandular atrophy, intestinal metaplasia, and gastric surface epithelial changes was recorded in 50 cases.

**DISCUSSION**

Chronic gastritis is defined as the presence of chronic mucosal inflammatory changes eventually leading to mucosal atrophy and epithelial metaplasia. By far the most important etiological association is chronic infection by the bacillus *H. pylori*. The organism is a worldwide pathogen that has the highest infection rates in developing countries.

**Sex Distribution**

Age and sex related possibility of *H. pylori* was studied. In this study, out of 35 male cases, 16 cases (45%) are positive for *H. pylori* and out of 15 female 6 cases (40%) are positive for *H. pylori*. The male to female ratio is 2:1 which is in contrast to the study literature and study conducted by Khan.

**Age Distribution**

The higher prevalence of *H. pylori* is in the age group of 41-50 years, which had the highest percentage (53.8%) and followed by the age group 31-40 years (50.0%) (Figure 1). This is in consonance with Abdul Rahman E Fakhro who states that prevalence of *H. pylori* increased with advanced age. Anderson states that the prevalence of *H. pylori* in adults approximates 100% in many developing tropical countries.

The prevalence of *H. pylori* in this study is 44%. It does not coincide with the study of Fakhro et al., in their study the prevalence rates are 79.4%.

This high percentage may be due to low socioeconomic according to James et al.

In this study, 45 cases out of 50 show dyspepsia, abdominal pain, and iron deficiency anemia. These are the most common symptoms encounter in other studies also.

Perusal of literature shows epigastric pain, which is the most common symptom (92%) followed by vomiting (51%) and hematemesis (17%) in *H. pylori* associated chronic gastritis.

As per a study conducted by Desai et al. who revealed that geographic and social patterns play a role in the transmission of *H. pylori*. According to Anderson, East Asian countries

### Table 4: Comparison of endoscopic and histopathological findings

<table>
<thead>
<tr>
<th>Endoscopic feature</th>
<th>Histopathological feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric ulcer with erosion – 12</td>
<td>Chronic active antral gastritis - 10 with surface epithelial changes normal mucosa – 2</td>
</tr>
<tr>
<td>Antral gastritis with duodenal ulcer – 12</td>
<td>Chronic mild gastritis – 8, atrophic gastritis – 2, chronic active gastritis – 2</td>
</tr>
<tr>
<td>Nodularity of gastric mucosa – 5</td>
<td>Chronic active antral gastritis – 3, chronic gastritis with intestinal metaplasia – 2</td>
</tr>
<tr>
<td>Patchy erythematous changes - 6</td>
<td>Chronic mild gastritis – 1, chronic active antral gastritis – 5</td>
</tr>
<tr>
<td>Gastric ulcer duodenitis – 5</td>
<td>Chronic mild gastritis – 2, chronic gastritis with intestinal metaplasia – 3</td>
</tr>
<tr>
<td>Unremarkable mucosa – 10</td>
<td>Normal mucosa – 8, chronic mild gastritis – 1, chronic active antral gastritis – 1</td>
</tr>
</tbody>
</table>

### Table 5: Details histopathological findings

<table>
<thead>
<tr>
<th>Histopathology</th>
<th>Number of cases (%)</th>
<th>H. pylori status</th>
<th>H. pylori %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal gastric mucosa</td>
<td>10 (20)</td>
<td>2 positive</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 negative</td>
<td></td>
</tr>
<tr>
<td>H. pylori associated CAAG</td>
<td>24 (48)</td>
<td>16 positive</td>
<td>66.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 negative</td>
<td></td>
</tr>
<tr>
<td>H. pylori associated chronic non active gastritis (mild)</td>
<td>9 (18)</td>
<td>4 positive</td>
<td>44.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17 negative</td>
<td></td>
</tr>
<tr>
<td>Chronic gastritis with atrophy</td>
<td>2 (4)</td>
<td>All negative</td>
<td>0</td>
</tr>
<tr>
<td>Chronic gastritis with intestinal metaplasia</td>
<td>5 (10)</td>
<td>All negative</td>
<td>0</td>
</tr>
<tr>
<td>H. pylori negative chronic non active gastritis</td>
<td>28 (76)</td>
<td>All negative</td>
<td>0</td>
</tr>
</tbody>
</table>

CAAG: Chronic active antral gastritis, H. pylori: Helicobacter pylori
where widespread sanitation has been introduced, the prevalence of *H. pylori* has shown downward trend.

As per study the high percentage of *H. pylori* positive individuals having gastric lesions were found to have a history of intake of spicy and non-vegetarian food. *H. pylori* infection highly frequent in dyspeptic patients and it is cardinal risk factor for chronic gastritis.\(^{16,17}\)

**Endoscopic Features**

Fiber optic gastroscopy helps collecting biopsy specimens under direct vision.

In this study, there were 12 cases gastric ulcer with erosion, out of which 8 cases (66%) were positive for *H. pylori*, and 12 cases of duodenal ulcer in which 9 cases were positive (70%) and small proportion of cases showing patchy erythematous changes, nodularity of gastric mucosa and of unremarkable mucosa were also found in endoscopy examination.

Normal looking gastric mucosa is most common single endoscopic finding, accounting for 20% cases. Although the results of endoscopic examination may show normal mucosa,\(^7\) histopathological examination may show positive for *H. pylori*. In these cases, the risk of re-infection is always there.

The positivity rate for duodenal ulcer is 70%, and gastric ulcer is 66% in our study. It is comparable to study by Tytget (1988) who found that 15 patients of duodenal ulcer and 9 out of 11 (81.8%) patients with gastric ulcers have the organism. And in 2002, Abdul Rahman E Fakhro,\(^4\) studied antral biopsy specimens from 25 patients with symptoms and diagnosis of duodenal ulcer, among whom the positivity rate is 84%. In a study by Zhang *et al.*,\(^{18}\) the prevalence of *H. pylori* in gastric ulcer is 80.8%. Duodenal ulcer is usually associated with *H. pylori* infection. Treatment of duodenal ulcer must, therefore include acid reduction and *H. pylori* eradication all the time.

The most convincing data implicating *H. pylori* as a cause of cancer are furnished in the case-control studies from Hawaii, California, Great Britain, and Taiwa.\(^{19}\) In the first three studies (mean follow-up years 13, 14, and 6 years, respectively), serologic evidence of *H. pylori* infection associated with increased risk of developing gastric cancer, is 2.8-6 fold. The fourth nested case-control study also identified an elevated risk of cancer (odds ratio = 1.6), but the finding was not statistically significant. This last study was hampered, however by a small number of cases, and short follow-up period. Overall, the association between *H. pylori* and cancer appeared to be restricted to tumors distal to gastric cardia.

One line of research currently favors *H. pylori* infection as a causal factor in both mucosa-associated lymphoid tissue (MALT) and non-MALT gastric lymphomas.\(^{19}\)

When the density of *H. pylori* is low, application of endoscopic brush cytology helps in rapid detection.

Good evidence exists in the literature that *H. pylori* can cause chronic active gastritis. Most compelling and direct evidence are studied by Dr. Marshall *et al.* and subsequently by Moris and Nicholson.

As further evidence of pathogenicity, secretory immunoglobulin A directed against *H. pylori* has been isolated, and phagocytosis of the organism has been shown by intragastric neutrophil. Others have successfully eradicated the organism with antibiotics, with resultant improvement of histologic gastritis.

In this study, it is found that more or less the antral biopsies colonized by *H. pylori*, showed evidence of gastritis. It confirms the previously reported the high prevalence of *H. pylori* infection in association with antral gastritis further supporting the contention that *H. pylori* are the etiologic agent of this lesion in most cases.

*H. pylori* are now accepted cause of gastritis and peptic ulcer disease in adult.\(^3\)

Table 6 shows a comparative analysis of various studies in children, reporting relationship between *H. pylori* infection and histological evidence of gastritis percentage in adults. This shows 50% of cases of gastritis show *H. pylori* positivity in contrast to the pediatric cases. Probably environmental factors, socioeconomic status, alcohol, and smoking modified the development of gastritis with typical symptoms in adults.

According to Dixon degree of chronic inflammatory cell infiltration is correlated to the extent and density of *H. pylori* colonization. However, we could not find a significant correlation between these two factors and the differences can be explained\(^{20}\) as follows:

1. Difference immunological, as well as histological responses in various age groups, could be due to genetic, social cultural economical, and psychological factors.
2. Some patients may have chronic inflammation (gastritis due to other causes and *H. pylori*, and infection) simultaneously
3. Partially treated a patient may show lower degrees of inflammation.

**CONCLUSION**

*H. pylori* are now widely recognized as the most common cause of primary or unexplained gastritis in adults as well
as children. RUT is a simple, cheap test, performed at endoscopy room itself using Heli-check test device. A “test and treat” strategy is recommended for most patients with undifferentiated dyspepsia. With this approach, patients undergo a noninvasive test for *H. pylori* infection and if positive, are treated with eradication therapy. This strategy reduces the need for antisecretory medications as well as the number of endoscopies.

**REFERENCES**


**Table 6: Comparative analysis of various studies**

<table>
<thead>
<tr>
<th>Name of the author and year</th>
<th><em>H. pylori</em> – infection (number of cases)</th>
<th>Histopathological gastritis (number of cases)</th>
<th>Percentage of <em>H. pylori</em> – infection associated with gastric inflammation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musgrove et al. 1988</td>
<td>54</td>
<td>61</td>
<td>88</td>
</tr>
<tr>
<td>Cohen et al. 1989</td>
<td>22</td>
<td>22</td>
<td>100</td>
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<tr>
<td>Elta et al. 1989</td>
<td>16</td>
<td>16</td>
<td>100</td>
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<tr>
<td>Gormally et al. 1995</td>
<td>19</td>
<td>19</td>
<td>100</td>
</tr>
<tr>
<td>Yeung et al. 1990</td>
<td>64</td>
<td>64</td>
<td>100</td>
</tr>
<tr>
<td>Present study</td>
<td>22</td>
<td>45</td>
<td>50</td>
</tr>
</tbody>
</table>

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Complications of Cataract Surgery in Patients with Pseudoexfoliation Syndrome in a Tertiary Care Hospital of West Bengal

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Abstract

Introduction: The pseudoexfoliation (PEX) syndrome is a production and deposition of fibrillar extracellular material in ocular structure. The prevalence of PEX based on hospital reports from India varies between 1.87% and 13.5%.

Aim: To study the prevalence of PEX, and complications during cataract surgery due to the pupillary rigidity and zonular weakness and instability as well as post-operative complications. The purpose of this study was to assess the frequency and types of complications of small incision cataract surgery (SICS) in patients with cataract and PEX.

Materials and Methods: A cross-sectional descriptive study was conducted on 3334 eyes of 512 patients with cataract and PEX who underwent SICS in a tertiary care hospital from 1st July 2013 to 31st December 2016. The PEX was diagnosed by the presence of gray flakes on the anterior lens capsule or at the pupillary margin or both.

Results: Prevalence of PEX was 15.53% (512 cases). 358 (69.92%) patients were male, and 154 (30.07%) cases were female. There was tendency of increasing prevalence of PEX with advancement of age, 4 (1.24%) in 41-50 years, 51 (9.96%) in 51-60 years, 162 (31.45%) in 71-80 years, 213 (41.11%) in 71-80 years, and 88 (16.98%) were >80 years of age group. Poor pupillary dilatation in spite of the use of standard mydriatic drops and nonsteroidal anti-inflammatory drugs was the most common finding in 334 (65.32%) cases. In 62 (12.10%) cases, a supplementary procedure of pupillotomy was done. Other problems encountered were accidental iridodialysis in 6 (1.17%), zonular dialysis in 7 (1.36%) posterior capsule rupture with vitreous loss in 14 (2.73%), retained cortical matter in 44 (8.59%), and decentred intraocular lens 23 (4.49%) cases.

Conclusion: Presence of associated PEX in cataract patients significantly increases the risk of vision-threatening complications. Use of flexible iris hooks for small pupils and capsular stability are advocated, capsular tension rings and high viscosity viscoelastics are useful modifications of surgical technique for good visual outcome.

Key words: Iridopathy, Phacopathy, Pseudoexfoliation, Zonular weakness

INTRODUCTION

The pseudoexfoliation (PEX) syndrome is a production and deposition of fibrillar extracellular material in ocular structure. The term PEX was coined by Lindberg 2 and was assumed that this material is created during earlier inflammation. The full description of PXE was made by Alfred Vogt who described it as a film on the anterior lens capsule, as a remnant of the pupillary membrane.3 Recently, it has been identified as an accumulation of whitish gray fibrinogranular extracellular pseudoexfoliative material produced by abnormal basement membranes of ageing epithelial cells in trabecular meshwork, equatorial lens capsule, pupillary margin of iris and ciliary body, hyaloid and endothelial surface of the cornea.4

The global prevalence of PEX shows extensive variations, in Ethiopia (39.3%),5 Finland (30.8%),6 Greece (28%),7 South Africa (26%),8 Portugal (25.3%),9 and Turkey (16.7%).4 In our country, the prevalence of PEX in South

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India was found to be 3.8% and Andhra Pradesh, India, eye disease study reported it as 3.01%,10,11 While study in Kashmir showed overall prevalence rate 26.32%.12 This wide variations of PEX globally and in a different region of India draws our attention to study the prevalence of PEX and complications of cataract surgery with PEX syndrome in a tertiary eye care hospital of West Bengal.

The deposition of PEX on iris (iridopathy) and lens (phacopathy) with zonular instability make routine cataract surgery a challenging task. Scorolli13 observed that there is increased the risk of intraoperative complications in cataract surgery on such patients. In majority of such cases, the early detection passes unnoticed due to poor dilatation. Our study was performed with the aim of to find prevalence of PEX in patients attending eye outpatient department for cataract surgery by observing presents of gray flakes of PEX material on the anterior lens capsule or at the pupillary margin or both, and studying the intraoperative and post-operative complications during cataract surgery in patients with PEX and to suggest measures to minimize the possibility of such complications.

**MATERIALS AND METHODS**

A prospective cross-sectional study was conducted in the eye department of a tertiary care eye hospital from 1st July 2013 to 31st December 2016. A total 3334 patient from the age of 46 to 84 years attending R. G. Kar Medical College, Kolkata, West Bengal, India, diagnosed with senile cataract planned for surgery were enrolled in our study. Prior approval from Institutional Ethics Committee was obtained for the study.

After a written informed consent, complete clinical evaluation was done regarding age, sex, occupation, visual acuity, projection of rays, anterior segment evaluation by slit lamp biomicroscopy, undilated and under full mydriasis with tropicamide 1% was performed to assess the type of cataract and grading was done according to Lens Opacities Classification System II. Cataract was classified morphologically as nuclear sclerosis (NS), cortical and posterior subcapsular, pseudoexfoliative deposit was looked for on the cornea, iris and pupillary margin, on the anterior capsule of the lens. Associated anatomical features looked for included pupillary ruff atrophy and pigment dispersion. Intraocular pressure was measured by Goldmann applanation tonometer, and angle evaluation was done by Goldmann 4 mirror gonioscope and graded by Shaffer's classification.

All patients were operated by one surgeon by small incision cataract surgery (SICS). All patients were given 0.5% moxifloxacin eye drop, 4 times daily for 3 days before scheduled surgery. Pre-operative pupillary dilatation was done by mydriatic-cycloplegic drops and nonsteroidal anti-inflammatory drugs. Pupillary diameter after dilation was measured and graded as good (7-9 mm), moderate (5-6 mm), and poor (2-4 mm).

All patients underwent extracapsular cataract extraction with posterior chamber intraocular lens (IOL) in the capsular bag by manual SICS technique under peribulbar block with 5 ml of 2% xylocaine and 5 ml of bupivacaine with 150 units/ml of hyaluronidase. 5% povidone-iodine drop was instilled into a conjunctival cul-de-sac. A fornix-based conjunctival flap was made, perlimbal blood vessels were cauterized, scleral incision was made with 15 no. blade superiorly, and sclerocorneal tunnel was constructed with crescent knife. Side port entry was made by lance tip, intracameral injection of trypan blue 0.6% was given to stain the anterior capsule. A continuous curvilinear capsulorhexis about 6-7 mm was made using needle cystotome. Gentle hydrodis section was performed to separate cortex from nucleus. Nucleus was delivered by irrigating vectis. Irrigation and aspiration were done with Simcoe’s two-way irrigation and aspiration cannula. Rigid, single piece biconvex poly methyl acrylate posterior chamber IOL with optic diameter 6 mm was implanted in the bag using Kelman-McPherson forceps. Subconjunctival injection of dexamethasone and gentamycin (80 mg/2 ml) was given. Postoperatively all patients were advised topical antibiotic-steroid (moxifloxacin with prednisolone acetate) eye drops for 6 weeks in tapering dose along with homatropine 2% eye drops for 2 weeks. The follow-up postoperatively schedule was on day 1, 1st week and 2nd week and at weekly intervals for 12 weeks to evaluate the intraocular inflammation, decentration/tilt of IOL and corneal decompensation.

**RESULTS**

Out of 3334 patients diagnosed and planned for cataract surgery over a period of 3½ years, the prevalence of PEX was found 15.53% (512 cases) (Table 1 and Figure 1). Prevalence of PEX was highest 358 (69.92%) in males and 154 (30.07%) in females (Table 1 and Figure 2). The age wise distribution was 4 (1.24%) in 41-50 years, 51 (9.96%) in 51-60 years, 162 (31.45%) in 61-70 years, 213 (41.11%) in 71-80 years, and 88 (16.98%) over the age of 80 years (Table 2 and Figure 1). A tendency of high prevalence with increasing age was observed. Mean age of patients with PEX was 73.67 years. Among 512 cases diagnosed with PEX, 263 (51.36%) eyes had NS, and 137 (26.75%) had a cortical cataract, whereas both NS and cortical cataract were present in 112 (21.87%) eyes (Table 3 and Figure 3).
A total of 512 patients diagnosed with PEX underwent cataract surgery by SICS technique and were evaluated for intraoperative and post-operative complication.

All patients were operated by one senior consultant with experience more than 5 years. The technique opted was manual SICS.

The notable intraoperative complication observed was rigid pupil. All eyes showed some evidence of pigment dispersion mainly on the anterior surface of the lens and cornea. 46 (8.98%) eyes had poor dilatation of the pupil. 254 (49.60%) eyes were found to be a moderately dilated pupil. However, none of the eyes got dilated more than 7 mm. There was no pre-operative subluxation in any case. All patients underwent cataract surgery using SICS technique. Surgical complications are shown in Table 4 and Figure 4. In 62 (12.10%) cases, supplementary procedure of iris sphincterotomy was carried out to facilitate capsulorhexis and nucleus delivery. 14 (2.73%) eyes had posterior capsule rupture, 14 (2.73%) had vitreous loss, 44 (8.59%) had retained lens matter, 23 (4.49%) had decentered IOL, 7 (1.36%) had zonular dialysis, and 6 (1.17%) had post-operative hyphema. 62 (12.10%) cases, supplementary procedure of iris sphincterotomy was carried out to facilitate capsulorhexis and nucleus delivery. 14 (2.73%) eyes had posterior capsule rupture, 14 (2.73%) had vitreous loss, 44 (8.59%) had retained lens matter, 23 (4.49%) had decentered IOL, 7 (1.36%) had zonular dialysis, and 6 (1.17%) had post-operative hyphema.
had posterior capsular rent with vitreous loss due to difficulty in surgical maneuver, all of them underwent anterior vitrectomy with peripheral button hole iridectomy and anterior chamber IOL was implanted. Patients were followed on the post-operative day 1, day 7, day 14 and at monthly intervals for 3 months to evaluate intraocular pressure spikes, increased in intraocular inflammation, decentration/tilt of IOL and corneal decompensation.

Post-operative corneal haze was seen in 58 (11.32%) cases. 61 (11.91%) had significant intraocular inflammation. The IOP was measured both preoperatively and postoperatively. We did not find any pressure spikes in any patient. Final visual acuity was recorded after 12 weeks of surgery. At the end of 12 weeks, 23 (4.49%) patients showed persistent corneal edema probably due to corneal decompensation. However, pre- or postoperative specular microscopy and pachymetry were not included in this study.

DISCUSSION

The prevalence of PEX based on hospital reports from India varies between 1.87% and 13.5%.14 In our study, the prevalence was found to be 15.53%. No such study on prevalence is reported earlier from this area. This prevalence is similar to the study conducted in other parts of the world but, it was high as compared to prevalence studies conducted in southern parts of the country. This difference can be attributed to a number of factors ranging from differences in the climatic and geographical conditions, ethnic origin and genetic factors. Variations also occur due to age and sex distribution of patients or population group examined; the clinical criteria used to diagnose PEX, the thoroughness of the examination and the ability of the examiner to detect early stages. Cataracts are known to be more common in PEX, with NS being the predominant type of cataract. Similar result was obtained in our study.

PEX is a common finding in elderly patients diagnosed with cataract, and it may be missed if the eyes are not examined under slit lamp. It is best assessed before the pupillary dilatation while lens related changes are best seen after dilatation.15 It has been reported earlier that an axial anterior chamber depth of <2.5 mm increases the risk of surgical complications five-fold.16 The ages group of patients diagnosed with PEX in this study was 40-80 years age group. Epidemiological studies of PEX have shown that it is more common in patients older than 60 years and prevalence further increases with age.9

Of the 512 patients studied, 263 (51.36%) had NS, 137 (26.75%) had cortical cataract, and both changes were seen in 112 (21.97%) cases. Most studies have found a strong association between PEX and nuclear cataract.17 It has been hypothesized that high levels of epithelial metabolic activity may be beneficial for ion pumps and electrolyte environment of cortical fibers.18 In this study, most frequent problem encountered was a rigid pupil and none of the pupils dilated more than 8 mm in spite of the use of standard mydriatic drops. We resorted to sphincterectomy, but other alternatives include bimanual stretching and use of iris hooks or flexible iris retractors. Sphincterectomy and stretching have the disadvantage of causing post-operative distorted pupil, which may even lead to the pupillary capture.

A well centered and adequately sized capsulorhexis is important in the presence of zonular weakness. Ideal size of a capsulorhexis should be 6.0-7.0 mm in diameter. A small capsulorhexis may lead to excessive pull on the zonules, difficulty in extracting nuclear material from capsular bag, increased risk of anterior capsular tear and a higher incidence of post-operative capsular phimosis. Excessive intraoperative manipulations cause post-operative corneal edema and iritis. In the presence of weak zonules, it may lead to severe complications of lens subluxation and vitreous loss.

Other complications encountered were also reported in the previous studies include iridodialysis, intraocular bleeding, and vitreous loss. These are because of difficult maneuvers due to small rigid pupils and zonular instability. Zonular fragility increases the risk of lens dislocation, zonular dialysis, and vitreous loss up to 10 times.4 Rate of vitreous loss varied from 0% to 11% across different studies.15

There was significant intraocular inflammation in 61 (11.91%) cases and corneal decompensation in 23 (4.49%) cases. There was a high frequency of post-operative inflammation in cases of retained subincisional cortex which may have caused the decentration of IOL. This complication may directly affect the visual recovery. Hence,
surgical skill becomes an important factor for good visual outcome in such patients.

To minimize the stress on the zonules, the strategies that may be adopted are well maintained anterior chamber, avoidance of intraocular fluctuations, liberal use of viscoelastics, gentle hydro procedures and free rotation of nucleus. In cases with frank zonular weakness, use of a capsule tension ring that distributes forces circumferentially also reduces post-operative IOLs decentration.

In our study, 44 (18.59%) of cases had posterior capsular opacification. Other studies have reported an increase in posterior capsular opacification following cataract surgery in eyes with PEX.16 This may be due to incomplete removal of cortical matter due to poor visibility secondary to a small pupil. In this study 23 (4.49%) cases showed IOL decentration which may be explained due to decentration of IOL bag.19

This study showed increased incidence of intraoperative and post-operative complications. The proper evaluation of cases with PEX syndrome keeping the multifactorial risk factors in mind may minimize the complications.

Conclusively, it can be said that there should be a routine procedure to dilate the pupil or to examine the lens with the slit lamp after dilatation, to detect the PEX syndrome. Pre-operative assessment should be directed to identify potential problems like the possibility of fragile zonules and difficult visualization due to small pupils. This can help with surgical planning, particularly predicting the possible need for ophthalmic visscosurgical devices, pupil expansion devices and use of capsular tension ring which can increase the margin of safety in these cases. Routine post-operative follow-up is required to monitor and address intraocular pressure, capsular contracture, and IOLs decentration issues. The limitation of this study was the duration of the study and also, pre- and postoperative specular microscopy and corneal pachymetry were not included.

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Assessment of Longitudinal Strain in Acute ST – Elevation Myocardial Infarction

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Abstract

Introduction: Strain imaging measures tissue deformation rather than tissue velocity. It localizes regional wall motion abnormalities as does the conventional methods such as WMSI and Simpson method. Conventional methods are based on the principle of measuring tissue velocity.

Results: Peak systolic longitudinal strain was reduced in the individual ischemic myocardial segments and uniformly normal in the non-ischemic segments. In anterior wall MI patients the WMSI was increased and strain reduced in mid, apical septum: LV apex: basal mid and apical lateral: basal mid and apical anterior segments statistical analysis of the data revealed positive correlation (>0.50) between the value obtained by WMSI and strain in the basal, mid and apical lateral segments basal mid and apical anterior. Even though the –mid septal apical septal and apical segments showed reduced strain statistical positive correlation was lacking in these areas. Similarly the basal septal, mid apical lateral segments: basal mid, apical inferior segments showed reduced strain and increased WMSI. However only the basal septum, basal, mid, and apical inferior segments showed positive correlation (>0.5). Correlation between 2D Simpson derived EF and strain derived EF was also calculated. The correlation was strongly positive in the AVMI group with a value of 0.87. The correlation in the IVMI group was also positive at 0.59.

Conclusion: Objective measurement of deformation (strain), in patients with acute myocardial infarction detected myocardial regions involved as well as the overall left ventricular (LV) function. These measurements, the WMSI and strain correlated with each other with regards to the regional as well as global LV function. Analysis based on coefficient of correlation showed peak systolic longitudinal strain as good as WMSI in this prediction

Key words: Ejection fraction, Longitudinal strain, ST elevation myocardial infarction

INTRODUCTION

Coronary artery disease is the leading cause of death worldwide. Every year about 29.8 million people in India suffer from acute myocardial infarction (AMI).¹ The AMI incidence though shows declining trend in the west it is on the rise in the developing work. Effective management of this increasing epidemic imposes a technical challenge as well as a socioeconomic burden to the third world countries.

In addition to the routine clinical and electrocardiographic (ECG) evaluation, echocardiography is an integral part of AMI management. Assessment of overall left ventricular (LV) function and the regional wall motion of individual myocardial segments is the essence of echocardiography in the patients with AMI. Traditionally, the regional wall motion is assessed subjectively by two-dimensional (2D) imaging and objectively by calculation of wall motion score index (WMSI). Global LV function is usually assessed by Teichholz and Simpson’s methodologies. These modalities have their own limitations in patients with AMI. Tissue Doppler imaging offsets some of the disadvantages of 2D echocardiography but by itself has several disadvantages in the assessment of regional and overall LV function. The introduction of strain imaging has stood the test of time since its introduction a decade ago. The modality of strain imaging is fast advancing with the initial
reports of Doppler based strain imaging now giving way to strain by 2D speckle tracking.

This study utilizes longitudinal strain derived by 2D speckle tracking for assessment of regional and global LV function in patients with AML and compares the same with traditional parameters such as WMSI and 2D derived ejection fraction (EF).

MATERIALS AND METHODS

Study Population
The study was conducted in patients admitted to the intensive care unit of Government Rajaji Hospital, Madurai. 52 patients with a diagnosis of acute ST elevation anterior wall myocardial infarction (AWMI) were studied. 32 patients have an acute AWMI, and 20 had inferior wall MI (IWMI). Age group of study in the AWMI group was 52.7 ± 9.4, in the IWMI group it was 50.7 ± 9.1. 22% of AWMI patients and 20% in the IWMI group were females. 32% patients in the AWMI and 30% in IWMI were diabetic. The prevalence of systemic hypertension in the AWMI was higher 43% and in the IWMI group was 20% smoking prevalence was substantial in both MI groups, 75% and 87% in AWMI and IWMI, respectively. 75% in the AWMI and 85% in the IWMI group were eligible candidates, and they were thrombolysed.

Inclusion Criteria
Patients with acute ST elevation MI (STEMI) - AW and IW.

Exclusion Criteria
1. Previous MI
2. Patients with unstable rhythm (atrial fibrillation, heart blocks, and ventricular tachycardia)
3. Patients with associated valvular heart disease
4. Patients with permanent pacemakers
5. Patients with congenital heart diseases.

In our study, the automated tracking by the machine may either be accepted as such or altered according to the wish of the operator if the automated tracking is not satisfactory. This is accomplished using the reference points function and adjusting the same to match the segment correctly. The strain was obtained at the peak systole by ECG gating placing the cursor at the individual curve at the peak systolic line gives the value of longitudinal strain of individual segment. Thus, the values are calculated for all the segments and displayed separately is a table. The global strain derived is automatically displayed by the software, and if the tracking is acceptable, this value may be taken as such. In other cases where the tracking is not satisfactory, the image settings are adjusted until a proper tracking is obtained. The image taken at the apical long axis view was consistently measured as that of the septum and lateral wall by the software though it did not mean it. Hence for the sake of questionable acceptability in recognized forms, the values in the particular view were ignored. This might be considered as one of the major limitation of the study.

The longitudinal strain obtained is depicted along the Y-axis of the image as % shortening/lengthening. The value can be manually calculated by noting the excursion of the plot of the individual myocardial segment. A good excursion of the plot along the X-Y axis is indicative of good myocardial strain, and hence a good LV function of the segment concerned. When there is a uniformly good excursion of all segments, it indicated normal global LV function.

Statistical Analysis
Data analysis was performed with the help of computer using epidemiological information package (EPI 2008) developed by Center for Disease Control, Atlanta. Using this software, range frequencies, percentages, means, standard deviations, and coefficient of correlation and P values were calculated. A P < 0.05 is taken to denote significant relationship. If the coefficient of correlation is more than or equal to ±0.5 is taken to denote significant relationship. If the coefficient of correlation is more than or equal to ±0.5, then there exists a significant relationship between the two variables. A coefficient of correlation of 0.8 or more signifies that a very strong relationship exists between the two variables.

RESULTS

Peak systolic longitudinal strain (PSLS) was reduced in the individual ischemic myocardial segments and uniformly normal in the non-ischemic segments. In AWMI patients the WMSI4 was increased and strain reduced in mid, apical septum: LV apex: Basal mid and apical lateral: Basal mid and apical anterior segments. Statistical analysis of the data revealed positive correlation (>0.50) between the value obtained by WMSI and strain in the basal, mid and apical lateral segments basal mid and apical anterior. Even though the – mid-septal apical septal and apical segments showed reduced strain statistical positive correlation was lacking in these areas. Similarly, the basal septal, mid apical lateral segments: Basal mid, apical inferior segments showed reduced strain and increased WMSI. However, only the basal septum, basal, mid, and apical inferior segments showed a positive correlation (>0.5) (Table 1).

Correlation between 2D Simpson derived EF and strain derived EF was also calculated. There was a positive correlation in the EF between the different modalities. The correlation was strongly positive in the AWMI group with a value of 0.87. The correlation in the IWMI group was
Table 1: Comparison of WMSI and PSLS values with coefficient of correlation

<table>
<thead>
<tr>
<th>Myocardial segment</th>
<th>AWMI group</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>IWMI group</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WMSI</td>
<td>PSLS</td>
<td>Correlation coefficient</td>
<td>WMSI</td>
<td>PSLS</td>
<td>Correlation coefficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal septum</td>
<td>1.28±0.46</td>
<td>−16.7±4.6</td>
<td>0.32</td>
<td>1.8±0.5</td>
<td>−10.3±4.9</td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid septum</td>
<td>2.06±0.67</td>
<td>−7.5±4.5</td>
<td>0.42</td>
<td>1.35±0.49</td>
<td>−17.4±4.4</td>
<td>0.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apical septum</td>
<td>2.44±0.5</td>
<td>−3.0±4.2</td>
<td>−0.02</td>
<td>1.0±0</td>
<td>−15.1±2.4</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal lateral</td>
<td>0.34±0.55</td>
<td>−15.9±4.7</td>
<td>0.53</td>
<td>1.25±0.44</td>
<td>−17.2±4.1</td>
<td>0.44</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mid lateral</td>
<td>1.44±0.56</td>
<td>−11.6±5.5</td>
<td>0.68</td>
<td>1.45±0.51</td>
<td>−12.4±4.8</td>
<td>0.54</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Apical lateral</td>
<td>1.81±0.59</td>
<td>−7.3±5.8</td>
<td>0.62</td>
<td>1.45±0.51</td>
<td>−11.6±4.3</td>
<td>0.23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apex</td>
<td>2.44±0.5</td>
<td>0.7±5.8</td>
<td>0.28</td>
<td>1.0±0</td>
<td>−15.2±3.3</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal anterior</td>
<td>1.5±0.57</td>
<td>−11.3±4.9</td>
<td>0.64</td>
<td>1.0±0</td>
<td>−20±2.6</td>
<td>-</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mid anterior</td>
<td>2.38±0.49</td>
<td>−0±4.2</td>
<td>0.56</td>
<td>1.0±0</td>
<td>−18.2±1.4</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apical Anterior</td>
<td>2.28±0.58</td>
<td>−3.1±4.5</td>
<td>0.52</td>
<td>1.0±0</td>
<td>−17.6±1.9</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apical inferior</td>
<td>1.0±0</td>
<td>−17±1.8</td>
<td>-</td>
<td>2.3±0.47</td>
<td>−3.2±5.81</td>
<td>0.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid inferior</td>
<td>1.0±0</td>
<td>−17.8±2.8</td>
<td>-</td>
<td>2.35±0.49</td>
<td>−1.8±5±7</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basal inferior</td>
<td>1.0±0</td>
<td>−19±3.1</td>
<td>-</td>
<td>2.45±0.51</td>
<td>−7.15±4.4</td>
<td>0.56</td>
<td></td>
<td></td>
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</tbody>
</table>

The numbers marked in bold show positive correlation (>0.50). AWMI: Anterior wall myocardial infarction, IWMI: Inferior wall myocardial infarction, WMSI: Wall motion score index, PSLS: Peak systolic longitudinal strain

Table 2: Correlation between 2D Simpson derived EF and strain derived EF

<table>
<thead>
<tr>
<th>Group</th>
<th>EF 2D values ascertained by</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simpson</td>
<td>Strain method</td>
</tr>
<tr>
<td>AWMI</td>
<td>39.1±8.1</td>
<td>38.8±10.9</td>
</tr>
<tr>
<td>IWMI</td>
<td>44.9±4.9</td>
<td>44.3±6.0</td>
</tr>
</tbody>
</table>

EF: Ejection fraction, 2D: Two‑dimensional
IWMI: Inferior wall myocardial infarction, AWMI: Anterior wall myocardial infarction

also positive at 0.59 (Table 2). Individual risk factor analysis revealed that the presence or absence of a particular risk factor did not significantly affect the strain or WMSI as both groups revealed similar trends (P > 0.05).

**DISCUSSION**

Strain imaging measures tissue deformation rather than tissue velocity. It localizes regional wall motion abnormalities as does the conventional methods such as WMSI and Simpson method. Conventional methods are based on the principle of measuring tissue velocity. Tissue tethering is an inherent disadvantage of these methodologies and cannot be avoided because of the geometric orientation of the myocardial fibers. Hence strain imaging using PSLS in acute MI patients may be used to overcome this disadvantage and quantify both wall motion score index and overall LV systolic function.

Strain can be measured in all three dimensions as the tissue deforms three-dimensionally. Thus the deformation in the longitudinal, radial and circumferential planes can be assessed in a patient with MI. However, the longitudinal fibers are the main fibers distributed in the subendocardial region, the region most susceptible for ischemia. Thus, measurement of longitudinal strain is more reasonable in a patient with acute myocardial ischemia.

The peak systolic strain is measured in this study because it is the magnitude parameter that corresponds with regional EF. We depend on the EF derived by the Q-Lab software based on the tissue deformation of individual myocardial segments. Hence, the assessment of peak systolic strain is ideal rather than end-systolic strain which is both timing and magnitude parameter that lacks information about the rate of contraction of individual myocardial fibers.

The results of the study show that the longitudinal strain in the myocardial segments shows good correlation with the previously well-evaluated methods such as WMSI and Simpson’s method.

Even though the correlation was not uniform as some of the segments, namely, the mid septum and apical septum and apex showed no statistical correlation, the overall values were reduced in these segments. Similarly, in the IWMI group, only the basal septal, basal mid and apical inferior segments showed a positive correlation. The basal septum is supplied by the right coronary artery and is not involved in AWMI. The strain pattern is not affected in this segment that correlates with the WMSI of such patients.

In the study by Edvardsen and Skulstad 6 patients undergoing angioplasty of the left anterior descending coronary artery (LAD) were studied. LV longitudinal wall motion was assessed by tissue Doppler echocardiography (TDE) and strain Doppler echocardiography (SDE) from the apical four-chamber view before, during and after angioplasty from multiple myocardial segments simultaneously. Segments not supplied by LAD remained unchanged. TDE showed reduced velocities in all septal segments (P = 0.05) during angioplasty WMSI increased during ischemia (P = 0.05). It was concluded that the new SDE approach might be a more accurate marker than TDE for detecting systolic regional myocardial dysfunction.
induced by LAD occlusion. The results of our study correlate well with that of this study mentioned. The ischemia was induced voluntarily in the study by Edvardsen and Skulstad whereas we have studied the patients who presented with acute STEMI. This was one of the pioneering studies by the authors early in 2001 regarding the utility of the new modality at that point of time.

In the study by Rosendahl et al. in 2010, it was shown that longitudinal peak strain detects a smaller risk area than visual assessment of wall motion in AMI; in this study, tissue Doppler analysis (peak strain, displacement, and mitral annular movement) was compared with visual assessment for the study of the correlation of measurements of global, regional and segmental function with final infarct size and transmurality. It was concluded that in patients with acute STEMI, WMSI, EF, strain, and displacement showed significant changes between the pre- and post-percutaneous coronary intervention exam. In a receiver operating characteristic analysis, strain had 64% sensitivity at 80% specificity and WMSI around 90% sensitivity at 80% specificity for the detection of the scar with transmurality.

Prognostic importance of strain and strain rate after AMI was studied by Antoni in their study of 659 patients after AMI. Patients were evaluated using strain, WMSI and LVEF. Strain was independently related to all endpoints and was found to be superior to LVEF and WMSI patients with global strain and strain rate higher than -15.1% and -1.06 s\(^{-1}\) respectively. Conclusion was that strain and strain rate provide well, that myocardial tissue Doppler velocity is an objective measure of regional LV responses to inotropic stimulation and ischemia, but is affected by tethering from adjacent segments and translational movement.

**Limitations**

Limitations in this study are that:

1. Angiographic correlation of region involved was not done
2. Correlation was positive (>0.50) in many of the variables compared. However, a very strong positive correlation (>0.80) was not obtained in many of the segments
3. The study is a single point study and follow-up of regional and overall LV function was not compared.

**CONCLUSION**

Echocardiography, done using two methods-subjective assessment of wall motion as well as objective measurement of deformation (strain), in patients with AMI detected myocardial regions involved as well as the overall LV function. These measurements, the WMSI and strain correlated with each other with regard to the regional as well as global LV function. Analysis based on the coefficient of correlation showed PSLS as good as WMSI in this prediction. Thus, advanced technological analysis of wall motion using strain imaging did contribute additional value compared with a conventional assessment such as WMSI and Simpson’s method.

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Clinical Effects of Intrathecal Ropivacaine and Ropivacaine with Dexmedetomidine in Inguinal Hernia Cases

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Abstract

Introduction: Ropivacaine is a first single enantiomer-specific compound, which has a reduced risk of cardiotoxicity, neurotoxicity, and rapid recovery of motor function. Post-operative pain relief is an important issue with ropivacaine. It has been used with many adjuvants for lower limb surgery, which has other side effects.

Aim: Aim of the study was to compare the clinical effects of intrathecal ropivacaine and ropivacaine with dexmedetomidine.

Materials and Methods: Inguinal hernioplasty cases were included in the study. Group 1 administered with 0.75% isobaric ropivacaine 3 ml + 0.5 ml normal saline and Group 2 administered with 0.75% isobaric ropivacaine 3 ml + 5 µg dexmedetomidine in 0.5 ml normal saline.

Results: Onset of sensory and motor block was early in Group 2 patients than Group 1 (Group 2 5.58 ± 3.56 > 8.0 ± 1.8 in Group 1) with the \( P < 0.05 \). Postoperatively Group 2 patients had delayed two segment regression and S2 segment regression, than Group 1 patients. \( P < 0.0001 \). In Group 2, patients out of 29 patients two patients were developed bradycardia with hypotension. Motor block duration was more with Group 2 patients than Group 1 \( P > 0.05 \). Time of getting rescue analgesia is very much delayed in Group 2 than Group 1 \( P < 0.0001 \).

Conclusion: Ropivacaine is a newer ideal, comfortable safe anesthetic of choice for intrathecal use in inguinal hernia surgery cases, American Society of Anesthesiologists (ASA I and II) and by adding dexmedetomidine we get a prolongation of analgesia.

Key words: Dexmedetomidine, Inguinal hernia, Ropivacaine, Subarachnoid block

INTRODUCTION

It is always our priority to select regional anesthesia in almost all procedures as much as possible. The subarachnoid block (or intrathecal) and epidural anesthesia are wonderful method of giving anesthesia in lower abdominal and lower limb surgeries.¹ With the help of lignocaine and bupivacaine, we are using spinal blockade for a long time since its invention.² Lignocaine and Bupivacaine are the drugs used for a long time. In this setting, one of the newer drugs ropivacaine has emerged and which is available as only isobaric solution. It is used mainly for epidural, nerve plexus blocks.³ Now, only it is available as 0.75% solution and most of us are not using it very much for subarachnoid block. That's why ropivacaine was chosen as 0.75% intrathecal for my study.

Dexmedetomidine is one of the newer drugs very much used for sedation and to potentiate the effect of local anesthetics.⁴

Aim

Aim of the study was to compare the clinical effects of intrathecal ropivacaine and ropivacaine with dexmedetomidine.

MATERIALS AND METHODS

This was a randomized, prospective comparative clinical study conducted in the Department of Anesthesiology at
Inclusion Criteria
Age between 30 and 60 years and only male cases, American Society of Anesthesiologists (ASA I and II) cases, weight 40-65 kg, elective surgeries (inguinal hernioplasty).

Exclusion Criteria
Patient refusal, known allergy, coagulopathy, patient on β blockers, long-term analgesic therapy, drugs which are known to interact with study drugs. Spinal administration of drug mixture: Group 1 administered with 0.75% isobaric ropivacaine 3 ml + 0.5 ml normal saline and Group 2 administered with 0.75% isobaric ropivacaine 3 ml + 5 μg dexmedetomidine in 0.5 ml normal saline.

RESULTS
The two groups were matched in respect of their demographic characteristics such as age and weight. The baseline clinical variables such as ASA grade, pulse rate (PR), systolic blood pressure (SBP), diastolic blood pressure (DBP), sensory, and motor block were matched between the two groups (Table 1).

The two groups were not significantly differed in respect of their mean ages (45.1 ± 8.6 ≈ 45.0 ± 4.9). Similarly, they were also not significantly differed between the mean weights of two groups (51.3 ± 5.3 ≈ 49.6 ± 4.0 and P > 0.05) (Table 1).

The baseline PR, SBP, and DBP were matched and shown in Table 3. The mean PRs between the two groups were not statistically significant (86.9 ± 8.9 ≈ 84.5 ± 9.3 and P > 0.05). The mean SBPs between the two groups were not statistically significant (121.3 ± 8.3 ≈ 120.3 ± 5.9 and P > 0.05). The mean DBPs between the two groups were not statistically significant (78.6 ± 4.4 ≈ 79.3 ± 2.6 and P > 0.05) (Table 2).

Baseline sensory block between the two groups was not significant (P > 0.05) (Table 3).

Table 4 describes the baseline ASA grade between the two groups. The two groups were not significantly differed between them (P > 0.05).

The two groups namely ropivacaine (Group 1) and ropivacaine and dexmedetomidine (Group 2) were not significantly differed at baseline, and hence they were comparable during and after surgery.

The two groups were compared during and after surgery to study the effectiveness of two drugs at different intervals in respect of sensory and motor blocks on set. The mean onset of sensory blocks between the two groups was statistically significant (P < 0.0001). The mean onset of Motor blocks between the two groups was statistically significant (P < 0.0001) (Table 5).

Table 6 shows the PR at different interval starting from 3 min to 8 h. From 3 min to 2 h, there was no significant

<p>| Table 1: Comparison of age between 2 groups |</p>
<table>
<thead>
<tr>
<th>Age (years)</th>
<th>N (%)</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>10 (34.5)</td>
<td>5 (17.2)</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>6 (20.7)</td>
<td>17 (58.6)</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>13 (44.8)</td>
<td>7 (24.2)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29 (100.0)</td>
<td>29 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table 2: Comparison of base line PR, SBP, and DBP between two groups |</p>
<table>
<thead>
<tr>
<th>Variables</th>
<th>Meant±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>86.9±8.9</td>
<td>84.5±9.3</td>
</tr>
<tr>
<td>SBP</td>
<td>121.3±8.3</td>
<td>120.3±5.9</td>
</tr>
<tr>
<td>DBP</td>
<td>78.6±4.4</td>
<td>79.3±2.6</td>
</tr>
</tbody>
</table>

<p>| Table 3: Comparison of sensory level between two groups |</p>
<table>
<thead>
<tr>
<th>Sensory level</th>
<th>Group 1</th>
<th>Group 2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T7</td>
<td>6</td>
<td>10</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>T8</td>
<td>23</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table 4: Comparison of ASA grade between two groups |</p>
<table>
<thead>
<tr>
<th>ASA grade</th>
<th>Group 1</th>
<th>Group 2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>25</td>
<td>26</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>II</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table 5: Onset of sensory blockade (T10) and motor blockade (2) between two groups |</p>
<table>
<thead>
<tr>
<th>Blockade</th>
<th>Meant±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory</td>
<td>8.0±1.8</td>
<td>5.58±3.56</td>
</tr>
<tr>
<td>Motor</td>
<td>10.14±5.2</td>
<td>6.37±3.6</td>
</tr>
</tbody>
</table>

SD: Standard deviation
difference between the two groups. At 4 h, the PR among the Group 1 subjects was significantly greater than the Group 2, and the same was attributed to the risk of rescue analgesia. At 8 h, the PR was greater in Group 2 due to the above reason.

Table 7 shows the SBP at different interval starting from 3 min to 8 h. From 3 min to 2 h, there was no significant difference between the two groups. At 4 h, the PR among the Group 1 subjects was significantly greater than the Group 2, and the same was attributed to the risk of rescue analgesia. At 8 h, the PR was greater in Group 2 due to the above reason.

Table 8 shows the DBP at different interval starting from 3 min to 8 h. From 3 min to 1 h, there was no significant difference between the two groups. At 4 h, the PR among the Group 1 subjects was significantly greater than the Group 2, and the same was attributed to the risk of rescue analgesia. At 8 h, the PR was greater in Group 2 due to the above reason.

Table 9 shows the analgesia of two groups. The mean analgesia of Group 2 was 453.1 ± 20.2 and Group 1 was 217.2 ± 17.5. The Group 2 patients had a longer duration of analgesia than the Group 1 patients (453.1 ± 20.2 > 217.2 ± 17 and \( P < 0.0001 \)).

Figure 1 illustrates the significance of longer duration of analgesia of Group 2 than the Group 1.

Table 10 shows the two segment regression and S2 regression of two groups. The mean two segment regression of Group 2 was 131.7 ± 18.2 and Group 1 was 89.0 ± 18.2. The Group 2 patients had a longer duration of two segment regression than the Group 1 patients (131.7 ± 11.4 > 89.0 ± 18.2 and \( P < 0.001 \)). Similarly, S2

![Figure 1: Survival of analgesia between two groups](image)
regression was also significantly greater in Group 2 than in Group 1 (297.9 ± 25.3 > 243.1 ± 20.2 and \( P < 0.0001 \)).

Table 11 shows motor block durations between two groups. In Group 2, patients had long duration of blockade (3.94 ± 0.38 > 2.63 ± 0.41 and \( P > 0.05 \)).

**DISCUSSION**

Subarachnoid block is a simple, frequently used technique which provides very effective analgesia in lower abdominal surgeries. Ropivacaine is a newer drug with a more safety margin with reduced risk of cardiotoxicity. Dexmedetomidine is an is a \( \alpha_2 \) agonist which is very much used nowadays as an additive with local anesthetics. It gives intraoperative and post-operative analgesia with a single dose of subarachnoid block. Moreover, it is devoid of opioid side effects but may produce sedation, bradycardia, and hypotension. The onset of sensory and motor block was early in Group 2 patients than Group 1 (Group 2 5.58 ± 3.56 > 8.0 ± 1.8 in Group 1) with the \( P < 0.05 \). In Bogra et al.’s study, the addition of ropivacaine intrathecally produces a prolongation in the duration of the motor and sensory block.\(^5\) Bradycardia and hypotension are the known features of subarachnoid block. In our study in Group 2 patients out of 29 patients 2 patients were developed bradycardia with hypotension, they required atropine and ephedrine. Al-Ghanem et al. have reported the use of dexmedetomidine to be associated with decrease in heart rate and blood pressure.\(^6\) No patients have developed any nausea or vomiting in both groups. But in Group 2, patients were free of anxiety and they were comfortable. Both groups did not require any sedation intraoperatively. Postoperatively Group 2 patients had delayed two segment regression and S2 segment regression, than Group 1 patients (\( P < 0.0001 \)). Motor block duration was more with Group 2 patients than Group 1 (\( P > 0.05 \)). Time of getting rescue analgesia is very much delayed in Group 2 than Group 1 (\( P < 0.0001 \)). Yaksh and Reddy studied that a powerful analgesia can be produced by selectively activating adrenergic, opiate, and baclofenergic receptor systems in the spinal cord.\(^7\)

**CONCLUSION**

Ropivacaine is a newer ideal, comfortable safe anesthetic of choice for intrathecal use in inguinal hernia surgery cases, ASA I and II and by adding dexmedetomidine, we get a prolongation of analgesia.

**REFERENCES**

Fine Needle Aspiration Cytology of Fibroadenoma of Breast in a Tertiary Level Hospital

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Abstract

Introduction: Fibroadenomas are one of the main benign diseases of the breast characterized by an admixture of stromal and epithelial tissue. Although more common in young women, it is seen in women of any age including those who are postmenopausal. Early diagnosis and treatment can relieve anxiety associated with nonmalignant conditions of the breast.

Materials and Methods: A study was conducted during 1-year period, and all cases with breast lesion underwent fine needle aspiration cytology (FNAC) or excision biopsy. A total of 315 cases were analyzed.

Results: Of the 315 cases of fibroadenoma, most were married urban women of age group 12–20 years with average 11 months of symptoms (82%). The majority of fibroadenomas (50.1%) were 2-5 cm located in upper outer quadrant (40.8%).

Conclusion: Fibroadenoma is the most common benign lesions of the breast with maximum age of presentation <20 years in this study. FNAC serve as a rapid, economical, and reliable tool for the diagnosis of palpable breast lesions because of the cytopathological examination of these lesions before operation or treatment serves as an important diagnostic modality. Excision is the best treatment for women over 35 years to exclude malignancy.

Key words: Atypical ductal hyperplasia, Benign cystic diseases, Breast cancer, Fat necrosis, Fibroadenoma, Fine needle aspiration cytology

INTRODUCTION

Fibroadenomas are one of the main benign diseases of the breast characterized by an admixture of stromal and epithelial tissue. Although more common in young women, it is seen in women of any age including those who are postmenopausal. Although considered as a risk factor for the development of breast cancer, its reporting has been overshadowed by that of breast cancer. Fine needle aspiration cytology (FNAC) and radiological imaging- mammography and ultrasonography – as complements to clinical examination (triple test) have become the standard approach to investigations of palpable breast lump. Early diagnosis and treatment can relieve anxiety associated with nonmalignant conditions of the breast. Since fibroadenoma and breast cancer can appear as similar lumps, it is currently recommended to perform ultrasound and possible tissue sampling and subsequent histopathological analysis to perform diagnosis. Unlike typical lumps from breast cancer, fibroadenomas are easy to remove, with clearly defined edges.¹²

MATERIALS AND METHODS

This study was conducted in the Department of Pathology, Gauhati Medical College and Hospital located in Guwahati, Assam, for 1 year during the period 1st January 2016–31st January 2017. Material for the study comprised 315 patients presenting with breast lump either attending outpatient department or admitted in surgical wards, irrespective of age and sex. After taking detailed history, general, systemic and local examination of patient, which included age, marital status, age, rural or urban background,
duration of symptoms, premenstrual and postmenopausal symptoms, number of lumps, and size, and location of lumps were conducted, and the provisional diagnosis was made. FNAC of breast lump was carried out. The samples were obtained with aspiration and nonaspiration techniques with minimum passes to minimize hemorrhage. Samples were smeared onto glass slides and fixed and stained with Giemsa stain. Cases of fibroadenoma with atypia, atypical ductal hyperplasia, and breast carcinoma were also stained with PAP stain for detailed study of nuclear features. After examining the smears, cytological diagnosis was made.

RESULTS

Our study included 315 cases in 1 year period from 1st January 2016 to 31st January 2017. The ages of cases ranged from 12-67 years of age and maximum number of cases were, in the age group of 21-30 years 96 cases [30.5%] followed by 12-20 years age 85 cases [27%] and 31-40 years 83 cases (26.3%) out of 315. Among the type of the lesions, fibroadenoma showed the highest 158 cases (50.1%) incidence followed by carcinoma 48 cases (15.2%) and benign proliferative lesions 23 cases (7.3%). Inflammatory lesions were abscess 15 (4.7%), chronic mastitis 5 (1.6%), granulomatous mastitis 4 cases (1.3%) and fat necrosis 01 (0.3%). Cystic lesions included galactocele 2 cases (0.6%), Benign cystic lesions 9 cases (2.9%) and fibrocystic diseases 5 cases (1.9%). Other then fibroadenoma benign neoplasms include lactating adenoma 4 cases (1.3%), benign phyllodes 3 cases (1%), and pleomorphic adenoma 1 cases (0.3%). Category of atypical ductal hyperplasia included 10 cases (3.2%).

Cases designated as “others” included fatty tissue 5 cases (1.9%), inadequate smears 20 (6.3%) and Schwanoma 1 case (0.3%). The highest number of fibroadenoma (158) was in the age group of <20 years 71 cases (22.5%), and 21-30 years group was second 54 cases. Maximum of carcinoma cases were in the age group of 41-50 and 51-60 years of age group (13 and 11, respectively). Among the inflammatory lesions, the highest number was seen in the age group of the 21-30 years group 13 cases.

Our study that was mainly focused on fibroadenomas were 158 cases out of 315 cases with size 2-5 cm, firm and mobile on examination. Highest number of fibroadenoma 158 (50.1%) was in the age group of <20 years, 71 cases (22.5%), and 21-30 years group was second 54 cases (17.1%), About 31-40 years 26 cases (8.3%), 41-50 years 5 cases (1.6%), 51-60 years 2 cases (0.6%) and 0 cases above 60 years. Youngest patient was 13 years of age and oldest patient was 51 years. The most cases were in the upper outer quadrant. Side involvement showed mostly occurring in the left side 71 cases (44.9%) followed by right 64 cases (40.5%) and bilateral 13 cases (8.2%). There were 3 cases (1.9%) of cellular fibroadenoma out of which 2 were on the right side and one case bilateral. Fibroadenoma with atypia was 1 case (0.6%) on the right side. One case of fibroadenoma with atypia was also recorded. Microscopic pictures of fibroadenoma, cellular fibroadenoma, phyllodes tumor, and breast carcinoma along with Table 1 showing the different cases and their percentage of occurrence are shown in Figures 1-5.

DISCUSSION

Fibroadenomas arises in the terminal duct lobular unit of the breast. The typical case is the presence of a painless, firm, solitary, mobile, slow growing lump painless lump in the breast of a woman of childbearing years\(^2\)\(^4\) which in most cases were similar to our findings in our study. Fibroadenomas are partially hormone-related and

![Figure 1: Microscopic picture of fibroadenoma (low power view)](image1)

![Figure 2: Microscopic view of fibroadenoma (high power)](image2)
the diagnostic findings on needle biopsy show a bimodal pattern like nonneoplastic breast tissue but are more cellular. The epithelial fragments are regularly arranged, cohesive cells are large elongated and branching, stag horn like. There is variable nuclear crowding and overlapping. The nuclei are mildly enlarged but uniform, have a bland granular chromatin and often one or two small nucleoli. Single, bare bipolar nuclei are scattered in the background. Myoepithelial cell nuclei are also frequently seen within the epithelial aggregates. Fragments of fibromyxoid stroma are obtained from most but not all fibroadenomas. These features can be well appreciated in our smears stained with Geimsa as shown in the microscopic pictures of our study. Theses epithelial

<p>| Table 1: Different lesions of breast their age group and their percentage of occurrence |</p>
<table>
<thead>
<tr>
<th>Lesion category</th>
<th>Diagnosis</th>
<th>Age upto 20 years</th>
<th>21-30 years</th>
<th>31-40 years</th>
<th>41-50 years</th>
<th>51-60 years</th>
<th>&gt;60 years</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation</td>
<td>Abscess</td>
<td>1</td>
<td>11</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>15 (4.7)</td>
</tr>
<tr>
<td>Chronic mastitis</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (1.6)</td>
</tr>
<tr>
<td>Fat necrosis</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Granulomatous mastitis</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4 (1.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cystic lesions</td>
<td>Galactocele</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Benign cystic lesion</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>9 (2.9)</td>
<td></td>
<td></td>
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<tr>
<td>Fibrocystic disease</td>
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<td>3</td>
<td>2</td>
<td>5 (1.9)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Benign proliferative lesions</td>
<td>3</td>
<td>16</td>
<td>3</td>
<td>23 (7.3)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>benign Neoplasm</td>
<td>Lactating adenoma</td>
<td>3</td>
<td>1</td>
<td>4 (1.3)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fibroadenoma</td>
<td>71</td>
<td>54</td>
<td>26</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td>158 (50.1)</td>
</tr>
<tr>
<td>Benign phyllodes</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1 (0.3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Atypical lesions</td>
<td>Atypical ductal hyperplasia</td>
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<td>1</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>10 (3.2)</td>
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<tr>
<td>Suspicious of malignancy</td>
<td>1</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>5</td>
<td>48 (15.2)</td>
<td></td>
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<tr>
<td>Malignant Neoplasm</td>
<td>Carcinoma</td>
<td>1</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>5</td>
<td>48 (15.2)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Fatty tissue</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5 (1.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate smears</td>
<td>3</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>20 (6.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schwannoma</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1 (0.3)</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>96</td>
<td>83</td>
<td>29</td>
<td>14</td>
<td>9</td>
<td></td>
<td>315</td>
</tr>
</tbody>
</table>
sheets tend to show typical metachromatic blue staining on DiffQuick staining. Foam cells and apocrine cells may also be seen, although these are less diagnostic features.\(^\text{33}\)

Fibroadenoma was the major 158 cases (50.1\%) cause of breast lump in this study. 71 cases and 54 were in the age group of <20 and 21-30 years, respectively. Mayun \textit{et al.}\(^\text{34}\) found average group of fibroadenoma was 16 years which is similar to our study. And nearly similar to (28\%) to the findings of Ahmed \textit{et al.}\(^\text{35}\) from Sudan among their 200 cases, except for the slight variation in the age group with more frequency at 21-30 years of age in their study.

A recent pathological review shows fibroadenoma as the most common lesion followed by cystosarcoma phyllodes and fibrocystic diseases of breast. Rangabashyam \textit{I} and colleges in clinical study also showed fibroadenoma as the most common breast lesion but it was followed by inflammatory lesions and fibroadenosis.\(^\text{36}\) The study is similar to our study as fibroadenoma is the most common lesion 158 cases (50.1\%), but in our study, fibroadenoma was followed by carcinoma 48 (15.2\%) and benign proliferative lesions 23 (7.3\%) which is quite different.

The rate of occurrence in women who were examined in breast clinics was 7-13\%, while it was 7\% in another cases of autopsies.\(^\text{37,38}\) Malignant transformation in epithelial components of fibroadenoma is generally considered rare. The incidence of a carcinoma evolving within a fibroadenoma was reported to be 0.002-0.0125\%.\(^\text{39}\) In our study, there was no such report of carcinoma arising in fibroadenoma.

In the male breast, fibroepithelial tumors are very rare and are mostly phyllodes tumor. Exceptionally, rare case reports exist of fibroadenoma in the male breast; however, these cases may be associated with antiandrogen treatment.\(^\text{40}\) In our study, there was one case diagnosed and recorded as gynecomastia 45 years of age.

Higher intake of fruits and vegetable, higher no of live births, use of oral contraceptives, and moderate exercise are associated with lower frequency of fibroadenomas.\(^\text{41}\)

Approximately, 90\% of fibroadenomas are less than 3 cm in diameter similar to our case with size between 2 and 5 cm. However, these tumors have a potential to grow reaching a considerable size.

These tumors characteristically display hypovascular stroma compared to malignant neoplasms.\(^\text{42,43}\)

Up to 66\% of fibroadenomas harbor somatic mutations in the exon 2 of the mediator complex subunit 12 (MED 12) gene. In particular, these mutations are restricted to the stromal component.\(^\text{44,45}\)

A fibroadenoma is usually diagnosed through clinical examination, ultrasound or mammography and often a needle biopsy sample of the lump.\(^\text{46}\)

Most are left \textit{in situ} and monitored by a doctor, or the patient in question. Some are treated by surgical excision. They are left with a small margin of normal breast tissue if the preoperative clinical investigation is suggestive of the diagnosis. A small amount of normal tissue must be removed in case the lesion turns out to be phyllodes tumor at microscopic examination.\(^\text{47,48}\) In our department of surgery, most of the cases undergo surgical excision. Some fibroadenomas respond to treatment with ormeloxifene.\(^\text{49}\)

Fibroadenomas have not been shown to recur following complete excision or transform into phyllodes tumors following complete or partial excision.\(^\text{50}\) But in our study out of the 158 cases of fibroadenoma 3 cases were recurrent cases.

There are also natural treatments being tried to diminish fibroadenomas, such as fibrosolve, but no definite studies have been made as to improve their effectiveness.

The FDA has approved cryoablation of a fibroadenoma as safe, effective and minimally invasive alternative to open surgical removal in 2001.\(^\text{51}\) In the procedure, ultrasound imaging is used to guide a probe into the mass of the breast tissue. Extremely are used then used to destroy the abnormal cells,\(^\text{52}\) and over time the cells are reabsorbed into the body. The procedure can be performed in an office setting with local anesthesia only, leaves less scarring than open surgical procedures and no breast tissue deformation.\(^\text{53}\)

The American Society of breast surgeons recommends the following criteria to establish a patient as a candidate for cryoaablation of a fibroadenoma:\(^\text{54}\)

1. The lesion must be sonographically visible.
2. The diagnosis of fibroadenoma must be confirmed histologically.
3. Lesion must be 4 cm in size lesions.

They are the most common breast tumor in adolescent women. They also occur in a small number of postmenopausal women. Their incidence declines with increasing age, and in general, they appear before the age of 30 years. Women with fibroadenoma have a slightly higher risk of breast cancer later in life. If the lump is left in place and watched carefully, it may need to be removed at a later time if it changes or grows.
CONCLUSION

Fibroadenomas are the most common benign lesions of the breast with maximum age of presentation <20 years in this study. FNAC serves as a rapid, economical, and a rapid tool for diagnosis of palpable breast lesions because of the cytopathological examination of these lesions before operation or treatment serves as an important diagnostic modality. Exision is the best treatment for women over 35 years to exclude malignancy.

REFERENCES


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Efficacy of Shock Wave Lithotripsy in Lower Ureteric Calculus

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Abstract

Introduction: Extracorporeal shock wave lithotripsy (ESWL) and ureteroscopy (URS) are effective treatments in the management of ureteric calculus. ESWL is noninvasive, associated with less morbidity than URS. Moreover, URS requires specialized training, requires more anesthesia, and more often requires ureteral stent placement. We have analyzed the efficacy of ESWL in the management of lower ureteric calculus.

Materials and Methods: Study conducted in the patients attended in the urology clinic for the management of lower ureteric calculus. Forty-eight patients were included in the study. Informed consent obtained from all the patients after explaining all available modalities of treatments and they are divided into two groups based on stone size, Group 1: ≤10 mm and Group 2: >10 mm. These patients were again divided based on computed tomography-hounsfield unit (CT-HU) into Groups A and B, Group A: ≤1000 Group B: >1000 HU. All the patients underwent ESWL in domier compact delta II (electromagnetic generator) machine as outpatient procedure. Study data analyzed using SPSS (V: 17) software.

Results: Results of 48 patients analyzed. Stone-free rate in ≤10 mm group was 22/25 patients (88%) and in >10 mm group was 13/23 patients (56.5%) P < 0.01. When CT-HU increases success rate decreases, when HU was ≤1000 (Group 1A and Group 2A) 34 patients (85%) successfully cleared their stones, failure occurred only in 6 patients (15%). When HU > 1000 (Group 1B and Group 2B) only one patient cleared the stone (12.5%), failed in 7 patients (87.5%), this difference was statistically significant (P < 0.001).

Conclusion: In situ ESWL for lower ureteric calculus is an effective, non-invasive, and a viable treatment option with no major complications. Patients with lower ureteric calculus size ≤10 mm and CT-HU ≤ 1000 had high expulsion rate with ESWL. Other modalities of treatment may be needed in patients with stone size >10 mm and CT-HU > 1000.

Key words: Computed tomography hounsfield unit, Domier compact delta II, Extracorporeal shock wave lithotripsy, Lower ureteric calculus

INTRODUCTION

The indications for intervention in the management of patients with ureteric calculi have clearly been affected by the increased efficiency and lower morbidity of minimally invasive treatment modalities. Lingeman et al. reported that when a patient requires hospitalization, it is less costly to remove the patient’s stone with either SWL or ureteroscopy (URS) than to attempt to control the patient’s symptoms with pharmacotherapy only. However, many patients will pass the stone spontaneously.¹² Segura³ and associates reported on the management of patients with ureteric calculus for patients with stones of 5 mm or less, conservative management should be considered, whereas the chance of spontaneous passage for larger stones diminishes considerably, and intervention is recommended. The density of stone measured by non-contrast computed tomogram hounsfield unit (HU) varies with composition and determines the fragility of a calculus which ultimately governs the clinical outcome in extracorporeal shock wave lithotripsy (ESWL). Perhaps the greatest dilemma facing the urologist today is “to blast or not to blast” (i.e., to choose between the two most frequently used modalities in ureteric stone treatment-ESWL and URS). We studied

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Corresponding Author: Dr.M.Gayathiri, 652, Valar Nagar, Uthangudi, Madurai - 625 107, Tamil Nadu, India. Phone: +91-9442623059, E-mail: drgns@gmail.com
the efficacy of extracorporeal SWL in the management of lower ureteric calculus.

**MATERIALS AND METHODS**

Patients presented or referred to urology clinics for the management of lower ureteric calculus were included in the study. The institutional review board at our hospital approved the study. Informed consent obtained from all the patients after explaining all available modalities of treatments - medical expulsion therapy, URS and intracorporeal lithotripsy and extracorporeal lithotripsy, their complications in the management of lower ureteric calculus. History, physical examination, complete hemogram, urine routine and culture sensitivity, renal function test, X-ray kidney, ureter, and bladder (KUB), ultra sonogram KUB, contrast-enhanced computed tomography (CT) KUB. Lower ureteric calculus - stones below sacroiliac joint to vesico ureteric junction. Stone size measurements taken in the study were maximal transverse measurement in CT, and CT-HU of stones were measured simultaneously.4

Patients included in the study are divided into two groups based on stone size. Group 1: ≤10 mm and Group 2: >10 mm. Patients again divided based on CT-HU into Groups A and B, Group A: ≤1000 Group B: >1000 HU. Hence, study group contains Group 1A: ≤10 mm and HU: ≤1000, Group 1B: ≤10 mm and HU > 1000, Group 2A: >10 mm and HU: ≤1000, and Group 2B: >10 mm and HU > 1000.

Patients not willing for ESWL, bilateral ureteric calculi, ureteric obstruction distal to calculus, coagulation disorder/patients on anticoagulation drugs, pregnancy, sepsis, and end-stage renal disease were excluded from the study. ESWL was done with dornier compact delta II (electromagnetic generator) (Figure 1), patients on prone position. Injection pentazocine 30 mgs and Injection promethazine HCl 25 mgs intramuscularly administered 30 min before the procedure. Stone focusing was done fluoroscopically, 2500 shocks given for all patients - 60 shocks/min, in the intensity 4-5. Patients were followed in 15 days, 30 days, 60 days, and in 90 days or whenever patients had unusual urinary complaints after the procedure. Failure of ESWL - if any significant residual stone after 3 months.

**RESULTS**

The study comprised 50 patients who had satisfied the inclusion and exclusion criteria. Two patients lost follow-up after ESWL procedure; hence, results of 48 patients analyzed. Age of the patients ranged from 17 to 70 years; most patients were in 21-50 years. There were 35 male and 13 female patients in our study. The majority of patients presented with colicky pain and nausea/vomiting, other symptoms were dysuria and loin pain. Duration of symptoms ranged from 4 days to 1 month. In our study, size of the lower ureteric calculus range from 6 mm to 16 mm. Cases are divided into two groups based on stone size. Group 1: ≤10 mm and Group 2: >10 mm. In Group 1 (≤ 10 mm), 24 patients were with ≤1000 HU - Group 1A and one patient with >1000 HU Group 1B. In Group 2 (>10 mm), 16 patients were ≤1000 HU - Group 2A and 7 patients were with >1000 HU - Group 2B. In our study, left-sided stones predominated (27 points) over right-sided stones (21 points). In this study, one patient in Group 1 (≤10 mm) required second sitting of ESWL, 5 patients in Group 2 (>10 mm) required second sitting. Number of primary treatment increased when CT-HU was >1000 (Group 1B and Group 2B) when compared with CT-HU < 1000 (Group 1A and Group 2A) (Table 1), this difference was statistically significant (P < 0.01). Stone-free rate in ≤10 mm group was 22/25 patients (88%), and in >10 mm group was 13/23 patients (56.5%) (Table 2). This difference was statistically significant (P < 0.01). In Group 1 (≤10 mm), stone-free rate based on CT-HU showed when CT-HU was ≤1000 success rate significantly higher than >1000 HU (P < 0.001). Group 2 (>10 mm) stone-free rate based on CT-HU-HU showed when CT-HU was ≤1000 success rate was 75%, significantly higher than >1000 HU (P < 0.01). When CT-HU increases success rate decreases, when HU was ≤1000 (Group 1A and Group 2A) 34 patients (85%) successfully cleared their stones, failure occurred only in 6 patients (15%). When HU > 1000 (Group 1B and Group 2B) only one patient cleared the stone (12.5%), failed in 7 patients (87.5%), this difference was statistically significant (P < 0.001) (Table 3). During follow-up of post ESWL, few patients presented with minor complications. Dysuria was the major complication.
in most number of patients - 12 patients, hematuria in 5 patients, lower abdominal pain in 4 patients, and urinary tract infection in one patient. All complications were treated conservatively with hydration, antibiotics, and analgesics.

**DISCUSSION**

ESWL has revolutionized the treatment strategy of urolithiasis worldwide and continue to be a major therapeutic modality for treating the majority of upper urinary tract stones. Its non-invasive nature along with high efficacy has resulted in outstanding patient and surgeon acceptance.

The success rate of ESWL is determined by factors such as stone size, composition location, the presence of obstructive changes, and anatomical anomalies. Stone composition is one hidden factor which decides the fragility of calculus and its susceptibility to ESWL. The number of shocks required for fragmentation is related not only to the size of the stone but also to its hardness (or) brittleness which largely depends on its chemical composition.

Recommended treatment options, ESWL and URS, in ureteric stone have valid advantages and disadvantages. Supporters of ESWL claim that it is effective and non-invasive, is associated with less morbidity, requires fewer anesthesias than URS, and seldom requires ureteric stents. Critics argue that the success rates are not as high as those of URS, equipment availability may be limited, visualization of the stone is often difficult, attainment of a stone-free state requires a longer time and follow-up, re-treatment rates are higher, and costs are higher. Supporters of URS claim that it is highly successful and minimally invasive, is associated with minimal morbidity, can be used with larger and multiple stones, and has high immediate stone-free rates. Critics argue that it requires specialized training, requires more anesthesia, and more often requires ureteric stent placement.18,19

The primary goal in treating patients with ureteric calculi is a stone-free state, and the American Urological Association/European Association of Urology guidelines panel’s meta-analytic study reported that with ESWL in distal ureteric stone <10 mm, in 17 groups containing 1684 patients stone-free rate was 86% (80-91%).22 In our study, it was 88%. In >10 mm groups containing 966 patients stone-free rate was 74% (57-87%), in our study it was only 56.5%. All ESWL failure cases in our study underwent URS and intracorporeal pneumatic lithotripsy. All patients were stented following the procedure. DJ stents removed after 3 weeks. During URS and intracorporeal lithotripsy (ICL), no significant abnormality in either ureteric orifice or distal ureteric narrowing below the stone was noted.

There have been two randomized prospective studies comparing URS and ESWL for treatment of patients with distal ureteric stones subsequent to the guidelines document. Peschel et al. randomized 80 patients and found that those undergoing URS achieved stone-free status more rapidly, regardless of initial stone size, than did those treated by SWL. All of the patients undergoing URS were rendered stone free, whereas 10% of the SWL cohort required subsequent URS to achieve a stone-free status.23 Pearle et al. randomized 64 patients and reported that 100% of individuals who completed radiographic follow-up subsequent to either SWL or URS became stone free.24

One possible reason for the difference in this outcome compared with the Pearle et al. study is that an unmodified dornier HM3 lithotripter, which is known to fragment stones more efficiently, was used in Pearle’s study rather than the dornier MFL5000 used in Peschel’s study. In

<table>
<thead>
<tr>
<th>Table 1: Number of primary treatment based on CT-HU</th>
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<tbody>
<tr>
<td>Number of primary</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>≤1000</td>
</tr>
<tr>
<td>One</td>
</tr>
<tr>
<td>% within HU</td>
</tr>
<tr>
<td>Two</td>
</tr>
<tr>
<td>% within HU</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>% within HU</td>
</tr>
</tbody>
</table>

HU: Hounsfield unit, CT: Computed tomography

<table>
<thead>
<tr>
<th>Table 2: Stone-free rate in relation to stone size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eswl</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Group 1</td>
</tr>
<tr>
<td>≤10 mm</td>
</tr>
<tr>
<td>Success</td>
</tr>
<tr>
<td>% within size (cms)</td>
</tr>
<tr>
<td>Failure</td>
</tr>
<tr>
<td>% within size (cms)</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>% within size (cms)</td>
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</table>

ESWL: Extracorporeal shock wave lithotripsy

<table>
<thead>
<tr>
<th>Table 3: Stone-free rate based on CT-HU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone-free rate</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>≤1000</td>
</tr>
<tr>
<td>Success</td>
</tr>
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<td>% within HU</td>
</tr>
<tr>
<td>Failure</td>
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<tr>
<td>% within HU</td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>% within HU</td>
</tr>
</tbody>
</table>

HU: Hounsfield unit, CT: Computed tomography
our study, overall success rate was 72.9%; 27.1% of patients required secondary treatment. The lithotripter used was dornier compact delta II (electromagnetic generator). Joseph et al. assessed the susceptibility of stone fragmentation by ESWL according to HU in renal stone, they found that the success rate for stone with attenuation value ≤1000 HU was significantly higher than that for stone with value >1000 HU. In their study, they found a significant correlation between number of shocks required for stone fragmentation and the attenuation value of the stone.

Not much of data available in the literature on correlation between HU and stone-free rate in lower ureteric calculus. In our study, significant failure and retreatment rates in >1000 HU stones, both in Group 1 (≤10 mm) and Group 2 (>10 mm), but the number of patients in our study with HU > 1000 were small (8/48). Yip et al. studied efficacy of in situ ESWL in ureteric calculi management using dornier MFL 5000 lithotripter, their overall success rate was 81%. In our study it was 72.9%. Ghafoor et al. studied the efficacy of ESWL in the treatment of lower ureteric stones using second generation Siemens Lithostar II. Clearance rate for small stones (<10 mm) in the lower third of the ureter was 73.8%, and for stones larger than 10 mm in the distal third of ureter, the clearance rate was low 42.8%, with a high retreatment rate. Hence, Ghafoor et al. concluded that for distal ureteric stones <10 mm in diameter, the clearance rate is more than 70% and ESWL can be considered as a primary treatment, while for stones larger than 10 mm in diameter, endoscopic removal should be the preferred treatment.

In our study, the results were far better than Ghafoor et al. study, the clearance rate for small stones (<10 mm) was 88% compared with 73.8%. Clearance rate for stones larger than 10 mm was 56.5% still better than Ghafoor et al. study 42.8%.

In our study, total of 48 patients underwent in situ ESWL of lower ureteric calculus, 25 patients with stone size ≤10 mm, and 23 patients with >10 mm size. Dornier compact delta II was used in this study. All procedures were done as outpatient treatment. Overall stone-free rate was 72.9%, there were 27.1% patients required URS/ICL as secondary procedure.

In patients with stone size of ≤10 mm (Group 1) success rate was 88%, when CT-HU was ≤1000 (Group 1A) the success rate increased to 91.7%. In patients with stone size of >10 mm (Group 2) success rate was 56.5%, when CT-HU was ≤1000 (Group 2A) the success rate increased to 75%. Patients with CT-HU > 1000 retreatment and failure rate statistically increased when compared to ≤1000 HU stone patients in both groups. Overall failure rate in ≤10 mm (Group 1) was 12%, only one patient with CT-HU > 1000 (Group 1B) failed to clear the stone. Overall failure rate of in situ ESWL in >10 mm stone size patients were 43.5% (Group 2). When CT-HU was <1000 (Group 2A) it was only 25%, in patients with stone size >10 mm with CT-HU (Group 2B) stone clearance failed in all except one - 85.71%.

**CONCLUSION**

In situ ESWL for lower ureteric calculus is an effective, non-invasive, and a viable treatment option with no major complications. Patients with lower ureteric calculus size ≤10 mm and CT-HU ≤ 1000 had high expulsion rate with ESWL. Hence, ESWL may be considered as the primary treatment option. Other modalities of treatment may be needed in patients with stone size >10 mm and CT-HU > 1000. Patients with lower ureteric calculus size >10 mm and CT-HU ≤ 1000, ESWL can be tried with reasonable success.

**REFERENCES**


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Etiological Profile of Congestive Cardiac Failure in Children in a Tertiary Care Center in Tamil Nadu

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INTRODUCTION

Why is heart failure in children important? If we just consider the number of individuals affected, adult heart failure is clearly a more compelling public health problem. However, the relatively small numbers belie the overall economic and social impact of pediatric heart failure. When a child is admitted to the hospital for heart failure; the costs are considerably higher for children than adults because of the frequent need for surgical or catheter-based intervention. The demands of medical care can fray the family structure and adversely affect parental economic productivity. When a child dies of heart failure, the economic impact is magnified enormously because of the number of potentially productive years lost per death. For these and other reasons, heart failure in children is a serious public health concern. Cardiac failure is the inability of the heart to deliver the adequate cardiac output to meet the metabolic demands of the body. It is a common problem encountered in emergency pediatric practice. The majority of the children with congenital heart defects in the developing countries have been noted to present in advanced cardiac failure with the result of increased morbidity and mortality. It is also known that failure to carefully seek for the evidence of cardiac failure in children admitted with anemia, bronchopneumonia and other illnesses known to predispose to heart failure, has led to failure to recognize, diagnose and promptly treat heart failure in such children. The result of this is increased mortality from many of these treatable conditions.
Definition
Congestive heart failure (CHF) is a clinical syndrome in which the heart is unable to pump enough blood to the body to meet its needs, to dispose of systemic or pulmonary venous return adequately, or a combination of the two.

Andrews et al. report the incidence of heart failure assessed at first presentation to hospital to be around 0.87 per 100,000. Kay et al. report that the incidence of heart failure as a result of congenital defects is between 1 and 2 per 1000 live births.

The heart may fail if it is confronted with:
1. An excessive preload - Left to right shunts, mitral regurgitation (MR) and complete heart block
2. High afterload - Hypertension, aortic stenosis
3. Impaired myocardial contractility - Myopathy, myocarditis
4. Inadequate diastolic filling – Constrictive pericarditis and tachyarrhythmias.

Under these conditions, initially, various compensatory mechanisms come into play which has got salutary effects but the same compensatory mechanisms if pressed into play indefinitely cause nonsalutary effects and potentiates heart failure.

The well-established NYHA Heart Failure Classification is not applicable to most of the pediatric population.

The Ross Heart Failure Classification was developed to provide a global assessment of heart failure severity in infants and has subsequently been modified to apply to all pediatric ages. The Modified Ross Classification incorporates feeding difficulties, growth problems and symptoms of exercise intolerance into a numeric scale.

Modified Ross Heart Failure Classification for Children
• Class I – Asymptomatic
• Class II:
  • Mild tachypnea (or) diaphoresis with feeding in infants
  • Dyspnea on exertion in older children
• Class III – Marked dyspnea on exertion prolonged feeding times and growth failure
• Class IV – Symptoms such as tachypnea, retraction, grunting, or diaphoresis at rest.

The heart failure syndrome may arise from diverse causes. The causes of heart failure vary with age. Common causes of CHF are volume or pressure overload, or both, caused by congenital or acquired heart disease and myocardial diseases. Tachyarrhythmia and heart block can also cause heart failure at any age. By far the most common causes of CHF in infancy are congenital heart diseases (CHDs). Beyond infancy, myocardial dysfunctions of various etiologies are important causes of CHF. Among the rare causes of CHF are metabolic and endocrine disorders, anemia, pulmonary diseases, collagen vascular diseases, systemic or pulmonary hypertension, neuromuscular disorders, and drugs.

Symptoms of cardiac failure are poor weight gain, difficulty in feeding, fast breathing, persistent cough and wheezing, irritability, restlessness, and pedal edema.

Aim of the Study
The objective of this study is to find the incidence of congestive cardiac failure (CCF) among children admitted in a tertiary care center and analyzing the etiological profile of cardiac failure.

MATERIALS AND METHODS

Study Center
The study was conducted in the pediatric ward of a tertiary care center in Tamil Nadu.

Sampling
This is a prospective observational study conducted over a period of 1 year. In children between 1 month and 12 years of age admitted with a clinical diagnosis of CHF, detailed history, general, and systemic examination were done. X-ray chest, electrocardiogram (ECG), and echocardiogram (ECHO) were taken. And investigation to ascertain the other etiologies such as complete blood count, peripheral smear, hemoglobin (Hb) electrophoresis, bone marrow aspiration, and renal function tests were done. Enzyme assays were performed in suspected metabolic causes causing cardiac failure. High-resolution computed tomography (CT) was done for cases of bronchiectasis and 64 slice angiography was done for a case of pulmonary hypertension.

Data collected were recorded in a master chart. Data analysis was performed with the help of computer using SPSS software. Data were analyzed using simple descriptive statistics.

RESULTS
A total number of children admitted in the ward during our study period were 7095. Among them, 148 were admitted with cardiac failure. It constituted 2.09% of the total admissions (Table 1 and Figure 1).
Males admitted with CCF were 85 and females 63 making 57.4% and 42.6%, respectively. The male to female ratio is 1.3:1 (Table 2 and Figure 2).

In our study, the majority of the children admitted with cardiac failure were below 1 year of age (52.70%, \( n = 78 \)). 13.51% (\( n = 20 \)) were between 1 and 3 years of age, 10.14% (\( n = 15 \)) between 4 and 6 years of age, 10.14% (\( n = 15 \)) between 7 and 9 years of age, 13.51% (\( n = 20 \)) were 10 to 12 years old (Table 3 and Figure 3).

Around 92.57% (\( n = 137 \)) of the cardiac failure cases were due to cardiac etiologies whereas non cardiac causes constituted the remaining 7.43% (\( n = 11 \)) (Table 4 and Figure 4).

CHDs contributed 59.85% (\( n = 82 \)) of the heart failure cases due to cardiac etiology. The next common cardiac causes were rheumatic heart diseases and dilated cardiomyopathy making 15.33% (\( n = 21 \)) and 7.30% (\( n = 10 \)), respectively. The proportion of cases due to myocarditis, supraventricular tachycardia, infective endocarditis, pulmonary hypertension, scorpion sting, Pompe’s disease, mucopolysaccharidosis (MPS), and undiagnosed causes were 5.11%, 1.46%, 2.19%, 2.19%, 2.92%, 0.73%, 1.46%, and 1.46%, respectively (Table 5 and Figure 5).

Among the various congenital cardiac diseases causing cardiac failure, ventricular septal defect (VSD) is the most

---

### Table 1: Prevalence of cardiac failure among admissions

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total number of admissions during study period</th>
<th>Number of cases admitted with cardiac failure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4275</td>
<td>85 (1.20)</td>
</tr>
<tr>
<td>Female</td>
<td>2820</td>
<td>63 (0.89)</td>
</tr>
<tr>
<td>Total</td>
<td>7095</td>
<td>148 (2.09)</td>
</tr>
</tbody>
</table>

### Table 2: Gender distribution of the disease

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>85 (57.4)</td>
</tr>
<tr>
<td>Female</td>
<td>63 (42.6)</td>
</tr>
<tr>
<td>Total</td>
<td>148 (100)</td>
</tr>
</tbody>
</table>

### Table 3: Age distribution of cardiac failure cases

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month – 1 year</td>
<td>78 (52.70)</td>
</tr>
<tr>
<td>1-3 years</td>
<td>20 (13.51)</td>
</tr>
<tr>
<td>4-6 years</td>
<td>15 (10.14)</td>
</tr>
<tr>
<td>7-9 years</td>
<td>15 (10.14)</td>
</tr>
<tr>
<td>10-12 years</td>
<td>20 (13.51)</td>
</tr>
<tr>
<td>Total</td>
<td>148 (100)</td>
</tr>
</tbody>
</table>

### Table 4: Etiology of cardiac failure cases

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>137 (92.57)</td>
</tr>
<tr>
<td>Non cardiac</td>
<td>11 (7.43)</td>
</tr>
<tr>
<td>Total</td>
<td>148 (100)</td>
</tr>
</tbody>
</table>

---

Figure 1: Prevalence of cardiac failure among admissions

Figure 2: Gender distribution of the disease

Figure 3: Age distribution of cardiac failure cases
Among the 148 cases of cardiac failure, 11 had noncardiac etiologies. Anemia was the commonest noncardiac cause of cardiac failure in our study (72.72%, n = 8). Two

### Table 5: Cardiac etiologies of heart failure

<table>
<thead>
<tr>
<th>Cardiac etiologies</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHDs</td>
<td>82 (59.85)</td>
</tr>
<tr>
<td>Rheumatic heart diseases</td>
<td>21 (15.33)</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>10 (7.30)</td>
</tr>
<tr>
<td>Myocarditis</td>
<td>7 (5.11)</td>
</tr>
<tr>
<td>Supraventricular tachycardia</td>
<td>2 (1.46)</td>
</tr>
<tr>
<td>Infective endocarditis</td>
<td>3 (2.19)</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>3 (2.19)</td>
</tr>
<tr>
<td>Scorpion sting</td>
<td>4 (2.92)</td>
</tr>
<tr>
<td>Pompe’s disease</td>
<td>1 (0.73)</td>
</tr>
<tr>
<td>MPS</td>
<td>2 (1.46)</td>
</tr>
<tr>
<td>Undiagnosed</td>
<td>2 (1.46)</td>
</tr>
<tr>
<td>Total</td>
<td>137 (100)</td>
</tr>
</tbody>
</table>

MPS: Mucopolysaccharidosis, CHDs: Congenital heart diseases

### Table 6: Breakup of CHDs causing heart failure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSD</td>
<td>29 (35.37)</td>
</tr>
<tr>
<td>ASD</td>
<td>3 (3.66)</td>
</tr>
<tr>
<td>Patent ductus arteriosus</td>
<td>4 (4.88)</td>
</tr>
<tr>
<td>Aortopulmonary window</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Combined shunt lesions</td>
<td>15 (18.29)</td>
</tr>
<tr>
<td>Atrioventricular septal defect</td>
<td>12 (14.63)</td>
</tr>
<tr>
<td>Aortic stenosis</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Congenital MR</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Transposition of great arteries</td>
<td>7 (8.54)</td>
</tr>
<tr>
<td>Total anomalous pulmonary venous return</td>
<td>4 (4.88)</td>
</tr>
<tr>
<td>Tetrology of fallot</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Tricuspid atresia</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Ebstein anomaly</td>
<td>2 (2.44)</td>
</tr>
<tr>
<td>Double outlet right ventricle</td>
<td>1 (1.22)</td>
</tr>
<tr>
<td>Total</td>
<td>82 (100)</td>
</tr>
</tbody>
</table>

MR: Mitral regurgitation, VSD: Ventricular septal defect, ASD: Atrial septal defect, CHDs: Congenital heart diseases

### Table 7: Breakup of rheumatic heart diseases causing heart failure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR</td>
<td>13 (61.90)</td>
</tr>
<tr>
<td>MR and AR</td>
<td>5 (23.81)</td>
</tr>
<tr>
<td>MS with MR and AR</td>
<td>1 (4.76)</td>
</tr>
<tr>
<td>MS with regurgitation</td>
<td>1 (4.76)</td>
</tr>
<tr>
<td>MS</td>
<td>1 (4.76)</td>
</tr>
<tr>
<td>Total</td>
<td>21 (100)</td>
</tr>
</tbody>
</table>

AR: Aortic regurgitation
children developed cor pulmonale due to bronchiectasis and 1 had uremia as a cause of cardiac failure. (Table 8 and Figure 8).

**DISCUSSION**

In our study, the proportion of children admitted with cardiac failure among the total admissions during 1 year period in the pediatric ward in a tertiary care center is 2.09%.

Massin et al. in a prospective study of 1196 children over 10 years, reported heart failure in 124 children (10.4%) with congenital and acquired heart diseases. 5.8% of total pediatric admissions in Lagunju and Omokhodion's study of Ibadan study is due to CHF. The prevalence rate of CCF in Adekanmbi et al.'s study is 7.02%.

In our study, among the total children admitted with cardiac failure the male to female ratio is 1.3:1. The prevalence was higher among males than females in Rashid et al.'s study. In the study by Lagunju and Omokhodion, the male to female ratio is 1.2:1. Amoah and Kallen, in their study, reported the incidence of CCF among male to female was 1.2:1.

The prevalence of CHF is higher in children under 1 year of age in our study. 52.70% of the total admissions due to cardiac failure are between 1 month and 1 year of age. Keith reported that 90% of failure due to CHD occurred in 1st year of life. Keith in 1956 pointed out that if a patient of CHD does not develop failure within the 1st year of life, he is not likely to develop so in the next 10 years, unless complicated by anemia, infection or infective endocarditis. In Rashid et al.'s study, only 36% of the children with CCF fall under 1 year of age and the common age group with CCF is between 1 and 5 years of age. In Lagunja et al.'s study, 54% of admissions due to CHF is between 1 month and 1 year of age.

In this study, the overall common cause of CCF in children is CHDs. (55.4%). In Adenkambi et al.'s study, anemia forms the common cause (46%). In Lagunju and Omokhodion's study, the common cause of CHF was found to be acute lower respiratory tract infections (LRTIs) (36%).

Cardiac causes constitute 92.57% of all admissions due to cardiac failure and noncardiac causes forms 7.43%. Cardiac causes are more common than noncardiac causes. In Rashid et al.'s study, cardiac causes are 84% and noncardiac causes are 16% of cases of CCF. Luganju et al. report 31% cardiac causes and 69% of noncardiac causes as the etiology of CHF. In Adenkambi et al.'s study, cardiac causes from 12.5% and noncardiac causes from 87.5%.

In this study, among the cardiac causes, CHDs from the common cause of CCF admissions under 1 year of age and also between the age of 1 and 3 years. In more than 3 years to <6 years age group, myocardial dysfunction due to scorpion sting forms the common etiology. Rheumatic heart disease is the most common cause in more than 6 years of age. Rashid et al. reported that CHDs are the common cause of CHF in <1 year age group. Myocarditis constitutes the common cause between 1 and 5 years age group. Rheumatic carditis is the common cause in children more than 5 years of age.

CHDs from 59.85% of the cardiac etiology of CCF in this study. Among the CHDs, left to right shunt lesions constitute the major cause for CCF in <3 years of age. VSD is the most common among the CHDs causing CCF in this study forming 35.37% of the heart failure cases due to CHD. Rashid et al. reported that 44% of the CHD cases causing CCF in their study were due to VSD.
In Laganju et al.'s study, CHDs constituted 25% of total cases due to CCF and VSD constituted 44% of cases of CCF due to CHDs.

Combined shunt lesions constitute 18.29% of admissions due to CHD causing CCF in our study. Among them, 9 were due to VSD and atrial septal defect (ASD), 1 VSD and patent ductus arteriosus (PDA), 1 VSD, ASD and PDA, 3 VSD and pulmonic stenosis (PS) and 1 ASD, mitral valve prolapse and MR. Laganju and Omokhodion reported 5 cases of combined shunt lesions all of them being VSD and ASD which constituted 20% of the CHD causing CCF.

Among 16 congenital cyanotic heart diseases that presented with heart failure, transposition of great vessels (TGV) – 7 cases – 8.54% of the CHDs causing CCF. Three cases of TGV had associated ostium secundum ASD, 1 with VSD, 1 with PDA, 1 with AVSD and the remaining 1 associated with single ventricle. In Laganju et al.'s study, among the 25 CHDs as the cause of CCF, there were 4 transient global amnesia (TGA) cases forming 16%.

According to Rao, Group I TGA with intact ventricular septum the infant usually become symptomatic within the 1st week of life. Group II TGA with VSD presents with symptoms of CCF between 4 and 8 weeks of life. Moreover, Group III TGA with VSD and PS, the presentation is variable depending on the severity of PS.

In this study, the second common cardiac cause being rheumatic heart disease with failure – 21 cases, constitutes 14.19% of the admissions due to cardiac failure and 15.33% CCF due to cardiac cause. Acute rheumatic carditis was noticed in 11 cases and pulmonary hypertension in 7 cases. Rupture chordae was recognized in 3 of 21 cases. In Adekanmbi et al.'s study, 1% of CCF cases are due to rheumatic heart disease constituting 54% of the cases. In Laganja et al.'s study, rheumatic heart disease is responsible for 6% of CCF cases and the most common valvular lesion in affected patients was MR and it was seen in all. MS was associated in 3 cases.

About 10 out of 137 admissions due to cardiac causes of CCF in this study were due to dilated cardiomyopathy, forming 7.30%. One case had associated left ventricular (LV) clot, one case was associated with proximal renal tubular acidosis and rickets. Absent right depressor angularis muscle was noticed in one child. Moreover, one case presented with left hemiparesis. Lipshultz et al. report the incidence of cardiomyopathy in pediatric patients as 1.13 per 100,000 in the United States. Nugent et al. report that in pediatric patients the incidence of cardiomyopathy in Australia is 1.24 per 100,000. Primary cardiomyopathies are the principal cause of heart failure signs and symptoms in children with a structurally normal heart. In Jeffrey et al.'s study, the annual incidence of dilated cardiomyopathy in children <18 years was 0.57 cases per 100,000 per year. Incidence was higher in boys than in girls (0.66 in boys and 0.47 in girls per 100,000). Among them, 66% of the cases are idiopathic. Among the known causes, 46% are due to myocarditis and 26% are due to neuromuscular disorders. 1 and 5 years rates of death or transplantation were 31% and 46%, respectively.

Seven cases of myocarditis, 3 male and 4 female got admitted with CCF in this study. It forms 5.11% of the cardiac causes of CCF in this study. Among them, pneumonia was present in four cases. Two cases had diarrhea. Myocardial dysfunction due to scorpion sting was noticed in four cases. Myocarditis constituted 1% of CCF cases in the study by Adekanmbi et al. Acute viral myocarditis formed the overall common etiology of CCF in Rashid et al. constituting 53% of cases between 1 and 5 years age group.

Das et al. in a study of 32 children admitted with scorpion envenomation reported that 16 (50%) children developed myocarditis and also reported that ECG is a sensitive indicator of myocarditis.

A 2-month-old child presented with cardiac failure in this study, his ECG showing high voltage QRS complexes, cardiomegaly in chest X-ray, ECHO showing concentric LV hypertrophy with global LV dyskinesia, mild LV dysfunction and Grade II MR. The level of acid maltase in his serum was 24 n mol/h/mg (normal level >60 n mol/h/mg), and a diagnosis of Pompe's disease was made. It constitutes 0.73% of cardiac causes of CCF.

Jacob et al. reported a 5 months old child with typical features of Pompe’s disease in the form of hypotonicity, hyporeflexia, X-ray evidence of cardiomegaly, ECG evidence of short PR interval, ECHO evidence of LV hypertrophy, and histopathological evidence of increased glycogen accumulation in skeletal muscle biopsy. Death occurred 2 months after symptom onset. There is a history of similar illness in previous two siblings present.

About 1.46% of the cardiac causes of CCF in this study are due to valvular lesions due to mucopolysaccharidoses in this observational study. One 12-year-old child had increased urinary glycosaminoglycan concentration (357.22 mg GAGs/g of creatinine against the normal value of 10.77-77.5) and undetectable levels of arylsulfatase B activity and grouped as Type VI MPS, Maroteaux-Lamy syndrome. Her ECHO revealed MS, dilation of the left atrium and right ventricular hypertrophy.
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Wippermann et al. in a study of 84 children with MPS reported 64.3% of MR and 40.5% of aortic regurgitation (AR). The frequency of aortic and/or MR was 75% in all patients, 89% in MPS I, 94% in MPS II, 66% in MPS III, 33% in MPS IV, and 100% in MPS VI. Combined MR and AR was present in 29%.¹⁹

Nearly 7.43% of CCF admissions were due to noncardiac causes. Adekanmbi et al. reported 87.5% of CCF cases were due to noncardiac causes. Noncardiac causes constituted 16% of etiology of CCF in Rashid et al.’s study. In Lagunju and Omokhodion’s study, 69% of CCF cases were of noncardiac etiology.

Among 11 admissions due to noncardiac causes, 8 cases were due to anemia (72.73%), 2 cases were due to bronchiectasis (18.18%), and one case due to chronic renal failure (9.09%).

All 8 anemia cases had Hb <6 g and all had cardiomegaly. Thalassemia – 1, hypochromic microcytic anemia – 1, dimorphic anemia – 2, pure red cell aplasia – 1, osteopetrosis – 2, and undiagnosed – 1. Anemia constitutes 5.41% of total admissions due to CCF in our study. In Adekanmbi et al.’s study, anemia is the most common cause of CCF, anemia alone constituting 46% and anemia and LRTIs constituting 11.5%. In their study, malaria was the most common cause of anemia. Lagunju and Omokhodion reports 28% of CCF is due to anemia in their study, malaria being the common cause constituting 16% of anemia cases followed by sickle cell anemia forming 5%, septicemia 5%, prematurity 1%, and acute lymphoblastic leukemia 1%.

Khan et al. in a study of 212 patients with beta Thalassemia observed clinical CHF in 33 (15.6%) patients with the age range between 8 and 21 years.²⁰

Two female children, 7 years and 11 years old admitted with bronchiectasis and CHF in this study. Both had CT evidence of bilateral bronchiectasis and dilated right atrium and ventricle with pulmonary hypertension in ECHO. LRTIs constitute 1.35% of the total CCF admissions in this study. Lower respiratory infections are the most common cause of CCF in Lagunju and Omokhodion’s study constituting 36%. In Adekanmbi et al.’s study, isolated LRTI contributed 29% of CCF cases and 11.5% of CCF cases are due to LRTI and anemia.

One male child of 12 years, who is a known case of posterior urethral valve with chronic renal failure presented with CCF in our study constituting 0.68% of total admissions due to CCF. CCF CRF is the cause of 1% and 3% of CCF cases in Adenkambi et al.’s and Lagunju and Omokhodion, respectively. Liang et al. presented a 1.5-year-old girl developed CCF 9 months after she presented with hypertension. The hypertension was caused by renal artery stenosis.²¹ Parekh et al. cardiac complications are the major cause of death in 25% of children with advanced chronic renal failure.²²

CONCLUSIONS

In infants and children, early clinical and ECHO is needed to identify the structural heart lesions. Regular follow-up by applying Modified Ross Classification of Heart Failure to assess the progress of diseases will help in early recognition of failure and early referral for surgery. Early surgical intervention is needed for cases amenable to surgery to prevent morbidity and mortality. Precipitating causes like anemia, infections are to be identified and treated early. Valvoli Thittam which was pioneered by Government of Tamil Nadu 20 years back, empowering the school teachers to recognize sore throat and to treat with oral penicillin for 10 days needs to be reintroduced.

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Comparative Study between Bupivacaine and Bupivacaine Plus Potassium Chloride for Brachial Plexus Block

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Abstract

Background: Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. The prime duty of any anesthesiologist is to relieve pain in the perioperative period. Today regional anesthesia is well established as equal to general anesthesia in effectiveness and patient acceptability. Regional anesthesia is blocking of peripheral nerve conduction in a reversible way using local anesthetic agents.

Materials and Methods: Sixty patients of age group between 20 and 70 years of either sex of ASA Grade I and II category posted for various types of upper limb surgeries. The patients were randomly allocated into two groups. Supraclavicular brachial plexus block was performed. Group I (potassium group) – 30 ml of 0.375% bupivacaine with 0.2 mmol of potassium chloride (prepared by adding 0.1 ml of potassium chloride and 10 ml distilled water to 20 ml of 0.5% bupivacaine). Group II (plain bupivacaine group) received 30 ml of 0.375% bupivacaine only. The following parameters were observed after performing supraclavicular brachial plexus block in both groups: (1) The onset time of sensory and motor blockade. (2) The quality of sensory and motor blockade. (3) The duration of blockade.

Result: The onset of sensory and motor blockade was early in potassium group when compared to plain bupivacaine group, the duration of the blockade was prolonged in potassium group when compared to other group, the quality of blockade was better in potassium group when compared to other group.

Conclusion: The present study concludes that addition of potassium chloride to bupivacaine had a significant clinical advantage over plain bupivacaine on onset time, duration and quality of sensory and motor blockade in brachial plexus block.

Key words: Brachial plexus block, Bupivacaine, Potassium chloride, Supraclavicular approach

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.¹

It is always a subjective experience. Pain has been a major concern of humankind, and it has been the object of ubiquitous efforts to understand and to control it. Peripheral nerve blocks provide longer and more localized pain relief than neuraxial techniques while also avoiding the side effects of systemic medications. Regional anesthesia of the extremities and of the trunk is a useful alternative to general anesthesia in many situations.²

Regional anesthesia denotes interruption of pain impulse by physiological blockade at a certain point along their pathway of transmission in the peripheral nerves. Trephination was practiced by Incas, and their tradition holds that the “shaman” performing the procedure chewed cocoa leaves and spat into the wound producing local anesthetic effect.³

Brachial plexus nerve block was reportedly first accomplished by Halsted, when “he freed the cords and
nerve of the brachial plexus after blocking the roots in the neck with cocaine solution.4

Brachial plexus block evolved into a valuable and easy procedure for upper limb surgeries. Hirscheff introduced axillary and supraclavicular techniques. Most of the local anesthetic agents developed in between 1900 and 1940 were basically aminoester compounds. They lost their importance due to the short duration of action, associated allergic reactions, and systemic toxicity.

Lofgrens et al.6 continued the work with great energy, and after investigating with, more than a hundred compounds found xylocaine, a local anesthetic preparation, which marked a considerable advance.

In 1957 (David 19987) synthesized bupivacaine, an amide local anesthetic and was first clinically used in 1963 by Telivuo.

The main drawback of long-acting drugs was a delayed onset of action. To overcome this drawback following were tried like, addition of enzymes,8 buffered and carbonated solution,9 opioids,10 vasoconstricting agents,11 alkalizing and warming up local anesthetic solution,12 and potentiation of blockade by pain and muscular exercise.13

Of these, only additions of carbonates and potassium to local anesthetics have stood the test of time. Hence, an attempt was made to compare the effects of adding potassium chloride to bupivacaine for the onset of time and duration of sensory and motor blockade following supraclavicular brachial plexus block.

MATERIALS AND METHODS

The present study entitled “comparative study between bupivacaine and bupivacaine plus potassium chloride for brachial plexus block” was carried out at Mahatma Gandhi Hospital, Warangal, from January 2013 to April 2014.

Sixty patients of age group between 20 and 70 years of either sex of ASA grade I and II, admitted from January 2013 to April 2014, were selected for the study. The patients were undergoing elective and emergency surgery of the upper limb.

The exclusion criteria were patient's refusal, progressive neurological disorders, severe kidney or liver dysfunction, and history of bleeding disorders. Each patient was visited preoperatively, and the procedures were explained and informed written consent was obtained. Investigations such as hemoglobin %, total count, differential count, erythrocyte sedimentation rate, random blood sugar, electrolytes, urine albumin and sugar, chest X-ray, and electrocardiogram were done.

All the patients were pre-medicated with injection midazolam 2 mg slow IV 30 min before surgery. Each patient was randomly assigned to one of the two groups (30 patients each), Group I or Group II.

Group I (potassium group) received 30 ml of 0.375% bupivacaine with 0.2 mmol of potassium chloride (prepared by adding 0.1 ml of potassium chloride and 10 ml distilled water to 20 ml of 0.5% bupivacaine).

Group II (plain bupivacaine group) received 30 ml of 0.375% bupivacaine only.

Each patient was made to lie supine without a pillow, arms at the side, head turned slightly to the opposite side with the shoulders depressed posteriorly and downward by molding the shoulders over a roll placed between the scapulae. The supraclavicular area was aseptically prepared and draped. The anesthesiologist stands at the side of the patient to be blocked, facing the head of the patient since this position allows better control of needle.

An intradermal wheal was raised approximately 1 cm above the midclavicular point. The subclavian artery palpable in supraclavicular fossa was used as a landmark. The tip of index finger was rested in supraclavicular fossa directly over the arterial pulsation. A filled 10 ml syringe with a 23 gauge, 32 mm needle attached was held in right hand and patient was instructed to say “now” and not to move as soon as he felt a “tingle” or “electric shock-like sensation” going down his arm. The needle was inserted through skin and advanced slowly downward (caudal) rolled slightly inward (medially) and slightly backward (posteriorly).

As soon as paresthesia was elicited, the needle was fixed in position, and after confirming negative aspiration of blood, 30 ml of the respective drug was injected depending on whether the patient was allotted to either of Group I or II.

Time of onset of sensory block was recorded using pinprick in skin dermatomes C4-T2 once in every 3 min for the first 30 min after injection and thereafter every 30 min till patient regained normal sensations. The same observer assessed the motor block at same time intervals.

The person doing the procedure did not know whether the dilution contained plain bupivacaine or with potassium chloride. Onset of sensory block was from the time of injection of drug to time of loss of pain on pinprick. Onset of motor block was from the time of injection to time of complete loss of movement.
Sensory block was assessed by pinprick with a short beveled 25G needle as:
Grade 0 - No pain,
Grade 1 - Mild pain-grimace,
Grade 2 - Moderate pain-withdrawal, and
Grade 3 - Severe pain-screams.

Motor block was graded according to the movement of upper limb by the patient as:
Grade 5 - Normal movement of upper limb,
Grade 4 - Movement against resistance,
Grade 3 - Movement against gravity,
Grade 2 - Movement along gravity but not against resistance,
Grade 1 - Flickering movement and,
Grade 0 - No movement.

Grade 3, 2, 1 were partial block. Grade 0 complete motor paralysis that is when the patient could not move his limb at all.

The duration of sensory blockade was the time in minutes from the onset of analgesia to the recurrence of pain to pin prick. The duration of motor blockade was the time in minutes from the onset of paresis to the recurrence of motor movements.

The quality of sensory and motor block was studied and graded as per whether the blocks were complete, incomplete, or totally absent.

The usage of adjuvants after the block was graded according to whether the surgery was done under general anesthesia (Grade 3) due to complete failure of block, whether opioids were used during intraoperative period (Grade 2) or if adjuvants of any kind were not used throughout the surgery (Grade 1).

The heart rate and blood pressure were recorded at intervals of 5 min. The patients were watched for bradycardia, convulsions, restlessness, disorientation, drowsiness, and any other complications.

All the values were expressed as mean ± standard deviation. Statistical comparison was performed by Student’s $t$-test and Chi-square test.

$P > 0.05$ was considered to be statistically not significant, a $P < 0.05$ as statistically significant, a $P < 0.01$ statistically highly significant and a $P < 0.001$ as statistically very highly significant.

**RESULTS**

The present study was conducted on 60 consenting patients aged between 20 and 70 years. Group I received 30 ml of 0.375 % bupivacaine with 0.2 mmol of potassium chloride. Group II received 30 ml of 0.375% bupivacaine for brachial plexus block by supraclavicular approach.

**Demographic Data**

**Gender distribution**
The two groups were similar in sex-wise distribution as shown in Figure 1.

**Age distribution**
The two groups were similar in age as shown in Table 1.

**Weight distribution**
The two groups were similar in weight as shown in Figure 2 (Tables 2 and 3).

![Figure 1: Sex distribution](image1)

![Figure 2: Weight distribution](image2)

<table>
<thead>
<tr>
<th>Table 1: Age distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>21-30</td>
</tr>
<tr>
<td>31-40</td>
</tr>
<tr>
<td>41-50</td>
</tr>
<tr>
<td>51-60</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

$X^2 (3)=3.852, P=0.218$
Onset of sensory and motor blockade
In Group I, the mean onset time of sensory blockade was 10.43 min, and motor blockade was 9.43 min when compared to Group II having sensory onset of 26.33 min and motor onset of 23.93 min (Figure 3).

Duration of sensory and motor blockade
In Group I, the mean duration of sensory blockade was 467.67 min, and motor blockade was 477.67 min when compared to Group II having sensory duration of 205.67 min and motor duration of 215.67 min (Figure 4).

Comparison of mean onset between the groups
The onset of sensory and motor blockade was earlier in case of Group I when compared with Group II. The $P < 0.001$ which is statistically highly significant (Figure 5).

Comparison of mean duration between the groups
The duration of both sensory and motor blockade was prolonged in Group I when compared to Group II. $P < 0.001$ which is very highly significant (Figure 6).

Quality of sensory blockade
The quality of sensory blockade was better in Group I and the value was statistically significant when compared with Group II (Figure 7).

Quality of motor blockade
The quality of sensory blockade was better in Group I and the value was statistically significant when compared with Group II (Figure 8).

Quality of motor blockade
The number of adjuvants used in Group I were significantly less when compared to Group II. $P < 0.05$ which is statistically significant (Figure 9).

DISCUSSION
Brachial plexus block is widely used in our practice for elective forearm and hand surgeries. It provides good intra- and post-operative analgesia. Many substances have been added to local anesthetic agents in an attempt to prolong their duration of action. Among them, addition of carbonated solution and potassium to local anesthetic has stood the test of time.

Addition of potassium chloride to local anesthetic solutions increases the extracellular potassium concentrations and depolarizes the membrane.
We conducted studies on sixty patients with demographic data in terms of age, weight and sex being similar in both groups. The data collected was analyzed for statistical significance by Student's *t*-test and Chi-square test.

The onset of the blockade in potassium group was earlier when compared to plain bupivacaine group. In our study, the mean onset of sensory and motor blockade in potassium group was 10.43 and 9.43 minutes, respectively. The results of our study support the findings of Khosla et al.\textsuperscript{15} Who showed that addition of potassium chloride to bupivacaine significantly enhanced the onset of both sensory and motor blockade. In contrast to our study, the delayed onset of blockade proposed by Parris and Chamber\textsuperscript{14} may be due to the lower concentration of bupivacaine (0.25%) when compared to our study (0.375%).

The duration of sensory and motor blockade was significantly increased (*P* < 0.001) in potassium group when compared to other group. This is in agreement with Khosa et al.'s\textsuperscript{15} findings who found prolonged duration of analgesia.

### Table 3: Comparison of onset and duration of sensory and motor blockade

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>N</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th><em>P</em> Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onset of blockade (min) sensory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>10.43</td>
<td>30</td>
<td>1.633</td>
<td>8</td>
<td>13</td>
<td><em>t</em> (58)=20.889</td>
</tr>
<tr>
<td>Group II</td>
<td>26.33</td>
<td>30</td>
<td>3.836</td>
<td>20</td>
<td>33</td>
<td><em>P</em>=0.0001 HS</td>
</tr>
<tr>
<td><strong>Onset of blockade (min) motor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>9.43</td>
<td>30</td>
<td>1.547</td>
<td>8</td>
<td>12</td>
<td><em>t</em> (58)=20.740</td>
</tr>
<tr>
<td>Group II</td>
<td>23.93</td>
<td>30</td>
<td>3.503</td>
<td>18</td>
<td>30</td>
<td><em>P</em>=0.0001 HS</td>
</tr>
<tr>
<td><strong>Duration of blockade (min) sensory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>467.67</td>
<td>30</td>
<td>26.579</td>
<td>420</td>
<td>520</td>
<td><em>t</em> (58)=44.60</td>
</tr>
<tr>
<td>Group II</td>
<td>205.67</td>
<td>30</td>
<td>18.134</td>
<td>170</td>
<td>240</td>
<td><em>P</em>=0.0001 HS</td>
</tr>
<tr>
<td><strong>Duration of blockade (min) motor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td>477.67</td>
<td>30</td>
<td>26.579</td>
<td>430</td>
<td>540</td>
<td>44.60</td>
</tr>
<tr>
<td>Group II</td>
<td>215.67</td>
<td>30</td>
<td>18.134</td>
<td>180</td>
<td>250</td>
<td><em>P</em>=0.0001 HS</td>
</tr>
</tbody>
</table>
We have found that depth of sensory and motor blockade was significantly better in potassium group when compared to other group. Bromage and Burfoot\(^ \text{16} \) also found the intense quality of blockade when potassium was added to lignocaine in epidural blockade.

The decreased requirement of adjuvants in potassium group when compared to other group suggests greater quality of anesthesia. The results of our study support the findings of Parris and Chamber.\(^ \text{14} \)

Thus potassium chloride definitely has a role as an adjuvant to bupivacaine hydrochloride in shortening the onset time, prolonging the duration of action and improving the quality of blockade in brachial plexus block.

Apart from anatomic variations, individual patient’s responses and discrepancies in the number of patients studied should also be taken into account to explain the differences among the studies. Further study of other agents and sites of blockade is required.

**CONCLUSION**

The present study concludes that addition of potassium chloride to bupivacaine had a significant clinical advantage over plain bupivacaine on onset time, duration, and quality of sensory and motor blockade in brachial plexus block.

**REFERENCES**


Outcome of Duhamel’s Pull-through in Hirschsprung’s Disease: A Tertiary Center Experience

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Abstract

Background: Duhamel’s procedure (DP) is one of the classical surgeries described for Hirschsprung’s disease (HD). It is the most common procedure for HD at our center.

Objective: Analysis of the results, complications, and follow-up of DP in patients of HD at a tertiary care center.

Materials and Methods: Medical records of 72 patients who had undergone DP for HD at a tertiary care institute were obtained. These patients were followed in the outpatient’s department to see their quality of life and any complications. This data were used to critically analyze this operative method and its results.

Results: Wound infection (5.56%), rectal stump leak (1.39%), perianal excoriation (5.56%), enterocolitis (8.33%), stricture formation (1.39%), constipation (6.94%), bleeding per rectum (2.78%), remnant spur and spur-related complication (4.17%), fecal impaction (2.78%), adhesive bowel obstruction (2.78%), incontinence (5.56%), and lower urinary symptoms (9.72%) were some complications observed in this study. Most of these complications were successfully managed.

Conclusions: Staged DP done after an initial colostomy has good results and can be done in complicated cases presenting with perforation, long-segment disease, enterocolitis, and massive megacolon. Post-operative complications can usually be managed successfully leading to a significant improvement in the quality of life.

Key words: Constipation, Duhamel’s procedure, Hirschsprung’s disease

INTRODUCTION

Hirschsprung’s disease (HD) is a developmental disorder of the enteric nervous system resulting in congenital aganglionosis of bowel. This causes chronic constipation. Operative intervention is the only treatment of this entity and involves the removal of the aganglionic segment and establishing intestinal continuity. Duhamel’s procedure (DP) which involves excision of the aganglionic segment with retrorectal pull-through, and anastomosis of the gangionated bowel is one of the classical surgical procedures for HD. We present the results of this procedure at our institute.

MATERIALS AND METHODS

This was a retrospective study conducted in the Department of Pediatric Surgery, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India. The medical records and follow-up details of 72 patients who underwent DP for HD between January 2011 and December 2016 were used to obtain data regarding their clinical history, investigation results, details of surgery, and any intra- or post-operative complications.

Procedure Details

Detailed history including age, demographic details, chief symptoms and their duration were noted from the hospital records. All the patients included in this study underwent...
DP following an initial stoma formation and leveling biopsy. Neonates and young infants were managed on stoma for a few months before their anal canal could accommodate the stapler used to divide the spur. Older children had to wait for longer duration for the hypertrophied bowel to lessen its caliber. None of these patients underwent primary DP. Hence, all these patients had biopsy-proven HD at the time of DP and this enabled biopsy-proven ganglionated segments to be pulled down during definitive surgery.

At the time of DP, stoma was mobilized and any significantly dilated segment sacrificed. 5 cm proximal to the site of stoma which had been proven to be ganglionated at the time of previous surgery, bowel was divided and this part was pulled down retrorectally to complete the anastomosis 1 cm proximal to the dentate line. Spur was divided by a 75 mm linear stapler. In cases of long-segment disease or sometimes in older children when the spur was too long to be taken care of by a single stapler from below; another 75 mm stapler was fired from above to ensure no remnant spur, and Martin’s modification was done to anastomose the rectal stump to the pulled down bowel at the same level. In cases where stapler misfired or could not divide the spur adequately, we used the Duhamel’s clamp and kept it for 5-7 days so as to divide the spur completely.

Important details included age at presentation, associated anomalies, level of aganglionosis, intraoperative time during DP, length of bowel resection, intraoperative blood loss, any intraoperative complication, length of stay in hospital, and any post-operative complication such as anastomotic leak, enterocolitis, stricture formation, perianal excoriation, constipation, and incontinence.

To assess continence in children >4 years of age, Kelly scoring was adopted which included three parameters: (1) Straining or smearing, (2) accidental defecation/soiling, and (3) strength of puborectalis muscle. All these parameters were scored from 0 to 2. Sum total of Kelly score was used to draw inference regarding continence: (1) Good continence - total score 5 or 6, (2) fair - total score 3 or 4, and (3) poor continence - total score 1 or 2.

All relevant data were analyzed.

RESULTS

Age at Presentation (Table 1)
This ranged from 5 days (neonatal) to 7 years (oldest).

Youngest child was 5 days old, whereas the oldest child was 7-year-old. Mean age was 16.24 months. 43% of the patients presented between 1 and 6 months of age. 15% of the patients presented beyond 2 years of age (late presenters) and most of them came from low socioeconomic group. Delayed presentation is common in developing countries like India and this increases the morbidity and complications of HD.

Sex Distribution (Table 2)
Male to female ratio of HD patients in this study was 5:1.

Associated Anomalies
- Down syndrome: 2 (3.86%)
- Congenital talipes equinovarus (CTEV): 2 (3.86%)
- Cardiac anomalies: Atrial septal defect - 2 (7.6%)
- Ventricular septal defect: 1 (3.86%).

Mode of Presentation (Table 3)
Constipation with abdominal distension was the most common symptom. History of delayed passage of meconium was seen in 52.78% patients while enterocolitis was seen in 16.67% of cases.

Level of Aganglionosis (Table 4)
Classical (Recto-sigmoid) HD was seen in 70.83% cases, while 29.17% cases presented with long segment disease.

Table 1: Age at presentation

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 month</td>
<td>08 (11.11)</td>
</tr>
<tr>
<td>1-6 months</td>
<td>31 (43.05)</td>
</tr>
<tr>
<td>6-12 months</td>
<td>12 (16.67)</td>
</tr>
<tr>
<td>1-2 years</td>
<td>10 (13.89)</td>
</tr>
<tr>
<td>More than 2 years</td>
<td>11 (15.28)</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 2: Sex distribution

<table>
<thead>
<tr>
<th>Sex</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>60 (83)</td>
</tr>
<tr>
<td>Female</td>
<td>12 (17)</td>
</tr>
</tbody>
</table>

Table 3: Mode of presentation

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non/delayed passage of meconium</td>
<td>38 (52.78)</td>
</tr>
<tr>
<td>Perforation</td>
<td>3 (4.17)</td>
</tr>
<tr>
<td>Constipation and abdominal distension</td>
<td>60 (83.33)</td>
</tr>
<tr>
<td>Enterocolitis</td>
<td>12 (16.67)</td>
</tr>
</tbody>
</table>

Table 4: Level of aganglionosis

<table>
<thead>
<tr>
<th>Level</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectosigmoid HD (classical HD)</td>
<td>51 (70.83)</td>
</tr>
<tr>
<td>Long-segment HD (beyond descending colon)</td>
<td>21 (29.17)</td>
</tr>
</tbody>
</table>

HD: Hirschsprung's disease
Intraoperative Time
This was influenced by many factors including age, prior history of enterocolitis, adhesions surrounding the stoma and bowel loops, and intraoperative bleeding.

Operating time varied between 90 and 180 min with a mean of 125 min. In 10 cases, failure of stapler added to the operating time and Duhamel’s clamp had to be applied in these cases.

Length of Bowel Resection
This again varied depending on the length of the spastic segment and the length and caliber of the dilated segment. This varied between 20 and 55 cm with a mean of 26 cm.

Intraoperative Blood Loss
This ranged from 15 to 120 ml with a mean of 35 ml.

Patients with significant adhesions, peristomal excoriation, older patients, and those with a history of enterocolitis had more blood loss which necessitated blood transfusion in the post-operative period.

Failure of Stapling Device during Procedure
About 10 (13.89%) of our patients had problems related to the stapling device. In these patients, Duhamel’s clamp was applied and kept for 5-7 days in the post-operative period. This decreased child’s movement and made him anxious.

In 6 (8.33%) patients, a second 75 mm stapler had to be fired from above to take care of a long spur not adequately taken care of by a single 75 mm stapler.

Length of Stay in Hospital
This ranged between 6 and 15 days with a mean of 8 days.

### Table 5: Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of patients (%)</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>4 (5.56)</td>
<td>Conservative dressings, intravenous antibiotics</td>
</tr>
<tr>
<td>Rectal stump leak</td>
<td>1 (1.39)</td>
<td>Proximal diverting stoma followed by anastomotic revision later</td>
</tr>
<tr>
<td>Perianal excoriation</td>
<td>4 (5.56)</td>
<td>Barrier skin protective agents</td>
</tr>
<tr>
<td>Post-operative enterocolitis</td>
<td>6 (8.33)</td>
<td>Bowel rest, intravenous medications, fluids, and rectal washes</td>
</tr>
<tr>
<td>Stricture formation</td>
<td>1 (1.39)</td>
<td>Improved on serial dilatation</td>
</tr>
<tr>
<td>Constipation</td>
<td>5 (6.94)</td>
<td>1 managed conservatively;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 had stricture, managed on dilatation;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 had remnant spur which needed division by clamp;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 had remnant dilatation of proximal colon resection and antegrade enema</td>
</tr>
<tr>
<td></td>
<td></td>
<td>through Malone’s procedure</td>
</tr>
<tr>
<td>Intraoperative Blood Loss</td>
<td></td>
<td>Conservative T/t; antibiotics</td>
</tr>
<tr>
<td>Remnant spur and spur-related complications</td>
<td>2 (2.78)</td>
<td>Washes; reapplication of Duhamel’s clamp to divide remnant spur</td>
</tr>
<tr>
<td>Fecal impaction</td>
<td>3 (4.17)</td>
<td>Rectal washes; laxatives</td>
</tr>
<tr>
<td>Adhesive bowel obstruction</td>
<td>2 (2.78)</td>
<td>Conservative management in one; adhesiolysis in other</td>
</tr>
<tr>
<td>Mortality</td>
<td>0 (0)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 6: Functional outcome

| Average stool frequency (3 weeks)        | 4.2/day                 |
| Average stool frequency (6 months)       | 2.6/day                 |
| Average stool frequency (1 year)         | 1.8/day                 |
| Incontinence                             | 4 (5.56%)               |
| Lower urinary symptoms                   | 7 (9.72%)               |

Complications (Table 5)
Post-operative enterocolitis, persistent constipation, wound infection and perianal excoriation was some of the important complications of the procedure.

Functional Outcome (Table 6)
Although the average stool frequency gradually became normal with age, a few patients complained of some degree of fecal incontinence and lower urinary symptoms.

Cost Analysis
The average cost of surgical procedure was around Rs. 31,150 which included the cost of operative procedure, stapling device, and post-operative stay.

### DISCUSSION
HD is the one of the common surgical cause for chronic constipation in children.²³

Surgical management of HD has evolved through the three classical surgeries (Soave, Swenson, and DP) and their modifications to single-staged techniques, total endorectal techniques, and laparoscopy-assisted procedures. Developments in histopathological techniques together with frozen section methods have gone hand-in-hand with advancements in surgical management. A committed histopathology team with this facility is a pre-requisite for all single-staged procedures. In a
Patients with HD represent a heterogeneous group, considering the age at which surgical consultation is taken and ways in which these patients present and are managed. Our study also reflects this heterogeneity. While some patients presented as neonates or young infants, there were significant number of late presenters (29.17% >1 year of age) whose parents had long been ignorant of their condition. Most of these late presenters were from low socioeconomic group and were denied early attention. Delayed presentation makes children vulnerable for related complications of HD. The mean age at which HD is diagnosed has gone down worldwide and in many developed countries, diagnosis in the neonatal period has increased. This has led to timely surgical intervention resulting in fewer incidences of HD-related complications and post-operative morbidity.

Male:female sex ratio of patients included in this study was 5:1. Male predominance in HD has been like most other series. However, there was no bias in the selection of the patients. This ratio only represents the way these patients turned up.

Different associations of HD have been described. In our series, we noted Down syndrome, CTEV, and cardiac anomalies as some of the associations. With a reported incidence of 4.5-16% in HD patients, Down syndrome is the most common chromosomal abnormality associated with HD. Patients of Down syndrome had difficulties in toilet training and although their symptoms improved with DP, they still had on and off constipation. Patients of HD with cardiac anomalies in our series did not have any unusual risk for anesthesia or surgery during definitive management. None of our patients had any unusual hereditary syndromes known to be rarely associated with HD such as Shah-Waardenburg syndrome, multiple endocrine neoplasia Type 2 syndrome, and congenital central hypoventilation syndrome.

About 4.17% of patients presented with perforation in the neonatal period. Site of perforation was cecum in one and ascending colon in 2 patients. In these patients, initially, stoma formation at the site of perforation with leveling biopsy was performed before a subsequent DP. It has been observed that 98% of normal full-term infants pass meconium in the first 24 h of life and the remainder by 48 h. In this study, 52.78% of patients gave a history of delayed or non-passage of meconium in the first 48 h of birth. Many ignorant parents, particularly of late presenters could not recall the time taken to pass meconium after birth. Chronic constipation and abdominal distension were noted in 83.33% of cases. Enterocolitis was seen in 16.67% patients. Reported incidence of enterocolitis has ranged from 12% to 58%. Classical rectosigmoid disease was seen in 70.83% of patients, whereas 29.17% patients had long-segment disease including one case of total colonic aganglionosis. Long-segment HD meant more length of bowel to be respected and more intraoperative time. One case of total colonic aganglionosis was managed using Martin’s modification of DP.

Intraoperative time during definitive DP depended on a large number of factors including the extent of adhesions following previous surgery, length of aganglionic segment, length and caliber of the dilated segment, whether Martin’s modification was applied or not to DP, whether some intraoperative difficulty was seen such as failure of the stapling device in dividing the spur. Mean duration of surgical procedure during this study was 125 min.

There was considerable variation in the length of the bowel resected. It varied from 20 to 55 cm with a mean length of 26 cm. It not only depended on the length of the spastic aganglionic segment but also on the length and caliber of the excessively dilated bowel proximal to it which had to be resected to facilitate normal transit. The reason to perform a longer resection that extends beyond the dilated and thick-walled bowel is to avoid bowel dysfunction owing to associated “hypo-” or “dys-” ganglionosis. Since our center does not have facilities for frozen section biopsy to confirm the presence of ganglion cells at the site of anastomosis; we had to be more liberal in resection of the intestinal segment to avoid the inconcordance between the radiographic transition zone and the pathologic extent of aganglionic bowel.

Resected specimens underwent histopathological examination for the confirmation of presence of ganglion cells in the upper segment of the resected bowel. All such specimens sent during this study showed the presence of ganglion cells at proximal end and their absence at distal end.

Intraoperative blood loss also varied depending on whether there was significant adhesion, peristomal excoriation and history of enterocolitis, length of the bowel resected, and age of the patient.

In a significant number of our patients, we had several practical problems such as failure of the stapling device...
(10 patients), inadequate division of the spur following application of staples (3 patients), large spurs requiring more than one stapler (6 patients), or non-availability of staplers due to cost constraints.

We had an unacceptably high failure rate of the stapling device. Careful analysis led us to conclude that staplers should be fired in a virgin space so that no suture should interfere in the line of the stapler and if possible, a new gun should be used in each case. Despite these precautions, in many of these patients, we had to resort to the application of Duhamel’s clamp for division of the spur. Although these patients had inconvenience in keeping the clamp in situ for 5-7 days, there was complete division of the spur following application of Duhamel’s clamp. Patients in whom Duhamel’s clamp was used had increased post-operative stay in the hospital compared to those patients in whom stapling device was used to divide the spur.

Mean post-operative stay of 8 days in our study is comparable to that reported by other investigators.\(^1\)\(^4\)

Post-operative complications observed in our study included wound infection (5.56%), rectal stump leak (1.39%), perianal excoriation (5.56%), enterocolitis (8.33%), stricture formation (1.39%), constipation (6.94%), bleeding per rectum (2.78%), remnant spur and spur related complication (4.17%), fecal impaction (2.78%), and adhesive bowel obstruction (2.78%). These complications have been variously reported in several large series.\(^1\)\(^5\)-\(^17\)

The incidence of enterocolitis in the post-operative period has been found to range from 5% to 26% in different studies.\(^1\)\(^5\)-\(^18\)\(^19\) We encountered enterocolitis in 8.33% of our patients. These patients improved on conservative management.

Two patients had delayed bleeding after 2 weeks of surgery. On examination, they had granuloma formation in the suture line on examination. They were conservatively managed and did not need any active surgical intervention.

One patient had leakage of the stump. In this patient, a proximal stoma was fashioned to divert the fecal stream.

One patient, who had lost to follow-up for a long time, presented after 3 years with progressive stenosis of the anastomosis and this led to progressive dilatation of the proximal bowel. This patient improved on serial dilatation and washes.

This study recorded fewer incidences of perianal soiling and excoriation, in comparison to other studies; these symptoms lessened with time and barrier skin protective agents helped in their healing.

Constipation has been reported to occur in 5-8% of patients following DP.\(^1\)\(^5\),\(^2\)\(^0\),\(^2\)\(^1\) In our study, we found constipation in 6.94% of cases. In 1 patient, constipation gradually improved on conservative management with rectal washes. 2 patients had remnant spur which led to fecal impaction and this was managed by dividing the spur with Duhamel’s clamp. 1 patient had stricture at the anastomotic site which was managed by serial dilatation; in one patient, there was significant dilatation of hypoperistaltic proximal bowel which necessitated its resection and antegrade enema using Malone’s procedure.

Assessment of incontinence was done in patients more than 4 years of age using Kelly score. 5.56% of patients were found to be incontinent. In a review of 2430 post-operative Duhamel patients, 5.3% of patients showed fecal soiling.\(^1\)\(^5\) Similar observations have been shared by other investigators.\(^2\)\(^2\),\(^2\)\(^3\) Most of these patients have been found to improve with time and do well with dietary modifications and bulking agents before any surgical intervention.

Average stool frequency was found to improve from 4.2/day at 3 weeks after surgery to 2.6/day at 6 months after surgery and 1.8/day at 1 year after surgery.

As many as 9.72% of patients had lower urinary symptoms such as urinary retention, poor stream, and dribbling of urine following DP. This observation was akin to those of other observers.\(^2\)\(^4\)

The etiology of these symptoms is multifactorial including damage to pelvic splanchnic nerves, hypogastric nerves, or pelvic nerve plexus. Furthermore, a large rectal reservoir may lead to outflow obstruction. Appropriate evaluation using sonogram, voiding cystourethrography, and urodynamic study guides further management in such patients.

No mortality occurred during this study. Most of the series on post-operative complications in DP have reported a low mortality rate and the most common cause has been enterocolitis.\(^1\)\(^5\)

**CONCLUSIONS**

Staged DP following initial colostomy for HD is an answer to the entire spectrum of the disease. It can be done with ease in uncomplicated as well as complicated cases such as those presenting with perforation, long-segment disease, enterocolitis, massive megacolon, and in setups without...
frozen section techniques. It has less complication and therefore, significantly improves the quality of life in patients suffering from HD.

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Distribution of ABO and Rh-D Blood Groups Among Blood Donors: Western India Data

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Abstract

Introduction: The distribution of ABO and Rhesus (Rh) - D blood groups varies from one population to another. The ABO and Rh blood groups play an integral role in blood transfusion service. They also have an important and useful role in population genetic studies and certain medico-legal cases. We carried out this study with the aim of determining the distribution of ABO and Rh blood groups among blood donors. This would also help in the planning of the ever increasing demand for safe blood and blood products.

Aim: This study was undertaken with the aim of determining the distribution of ABO and Rhesus blood groups among blood donors in a tertiary care hospital in Western India.

Materials and Methods: A retrospective study was performed over 5 years. The ABO blood grouping and Rhesus typing were done by tube method using venous blood samples.

Results: The most common blood group was “O” (32.38%), followed by “B” (31.40%), “A” (26.70%), and “AB” (9.51%). The frequency of Rh positive group (94.62%) is more than Rh negative group (5.38%).

Key words: ABO groups, Blood donors, Blood transfusion, Rhesus groups

INTRODUCTION

The ABO blood groups and Rhesus (Rh) blood group antigens are the most frequently studied genetic markers. Although the antigens involved in ABO and Rh blood groups are stable throughout the life, ABO and Rh genes and phenotype vary widely across different races and geographical areas.¹ The aim of any blood transfusion to the patient is that it should be beneficial to the patient. This is possible when we provide the patient with donor red cells that optimally survive after transfusion and serve their function.² The distribution of ABO and Rh blood groups is important for the effective management of blood banks.³ The ABO blood group system was the first human blood group system discovered by Landsteiner in 1900.⁴ The ABO blood group system is the only system in which antibodies are constantly present in the serum of human beings whose red cells lack the antigens. Depending on whether Rh antigen is present on red cells or not, Rh phenotype is classified as Rh - D positive and Rh-D negative. Although all individuals share the same blood group system, they differ in the frequencies of a specific type.⁵ ABO and Rhesus (Rh) groups varies markedly in different parts of the world. Karl Landsteiner discovered the blood groups ABO and classified it into A, B, and O groups. Blood group AB was discovered by Landsteiner’s associate, Von Decastello and Sturli in 1902. The Rh (D) antigens have greater immunogenicity than all other red cell antigens except A and B antigens. Transfusion of ABO-incompatible blood can be associated with acute intravascular hemolysis, renal failure and death. So in the blood bank, every blood donation is screened for ABO and Rhesus factor. This
study was conducted with the aim of determining the distribution of ABO and Rhesus blood groups among blood donors.

MATERIALS AND METHODS

This was a retrospective study conducted over a period of 5 years. Venous blood was collected in EDTA and plain clean vacutainer tubes and allowed to clot naturally at room temperature. The ABO blood grouping and Rhesus typing were determined by tube method. Forward grouping was carried out using monoclonal antisera; anti-A, anti-B, anti-AB, and anti-D (Eryclone, tulip diagnostics Ltd.). Results of ABO grouping were confirmed by reverse grouping using known A and B red cells. Rhesus negativity was confirmed by repeat testing and by Du-gel cards (DiaMed - ID, Coombs Anti-IgG cards).

Each antisera was validated before using it including titer and avidity of each new lot. For reverse group testing, cells were pooled from three different known donor samples. These pooled cells were prepared daily using pretested known blood group samples.

Statistics

After data collection, data entry was done in Excel. Data analysis was performed with the help of Epi Info version 8. Qualitative data have been presented with the help of frequency, and percentage table and association among various study parameters was assessed with Chi-square test. $P < 0.05$ was taken as significant.

RESULTS

We studied ABO and Rh blood groups in 76,653 donors composed of 91.79% male and 8.21% female donors as shown in Table 1. They were in the age group of 18-60 years. The distribution of ABO and Rh groups is shown in Table 2. Out of 76,653 donors, the most common blood group was “O” (32.38%), followed by “B” (31.40%), “A” (26.70%), and “AB” (9.51%) which was found to be statistically significant ($P < 0.05$%). Rh positivity was found in 72,526 (94.62%) donors while 4,127 (5.38%) donors were Rhesus negative.

DISCUSSION

Although ABO and Rh genes and phenotypes are stable throughout the life, they vary widely across races and various geographical boundaries. These genes and phenotypes also have different biochemical compositions. The polymorphism in these blood group system is important in population genetic studies, in evaluating the probability of hemolytic disease in the newborn, resolving paternity dispute cases and for forensic purposes. The distribution of ABO and RH-D phenotypes in different populations has been extensively studied. These blood group systems are not only important in blood transfusions but also associated with different diseases including cardiovascular diseases, organ transplantation, and erythroblastosis in neonates. Blood transfusion is a life-saving procedure but can cause acute and delayed complications. Complications of blood transfusions with wrongly labeled blood groups may be mild or can be life-threatening. Rh system found to be second most important blood group system due to hemolytic disease of newborn. The importance of Rh system has found in Rh-D negative individuals in subsequent transfusions once they develop Rh antibodies. This D antigen is the most important in transfusion practice in which the person whose red cell lacks the D antigen do not regularly have anti-D in their serum. The aim of this study was to determine the distribution

<table>
<thead>
<tr>
<th>Table 1: Total blood collection and sex distribution of donors</th>
</tr>
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<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>2007</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Group wise distribution of blood donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>2007</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
of ABO and Rhesus blood group among blood donors. In our study, the most common blood group was “O” (32.38%) followed by “B” (31.40%), “A” (26.70%), and “AB” (9.51%) which is comparable with other studies. The study by Nag and Das in West Bengal population were also observed that “O” blood group (34.8%) was common followed by blood groups “B” (33.6%), “A” (23.9%), and “AB” (7.7%) which is comparable with our study. Studies by Anjali et al.,7 Periyavan et al.,8 Enosolease and Bazuaye,9 Das et al.,10 Mwangi11 also showed that blood group “O” was the most common followed by group “B,” “A” and “AB” which is comparable with this study and also the findings regarding occurrence of Rh typing was almost in agreement to that from our study. In our study, Rh positivity was found in 72,526 (94.62%) donors while 4,127 (5.38%) donors were Rhesus negative. The study by Randriamanantany et al.12 also showed that Rh positive was by far the most prevalent which is comparable with our study. Other studies conducted by Hamed et al.13 showed 94.23% Rh (D) positivity and 5.77% Rh (D) negativity while Thakral et al.14 showed 93.39% Rh (D) positivity and 5.66% Rh (D) negativity which is comparable with our study.

CONCLUSION

We established that among the various ABO and Rh-D blood groups, blood group “O” is the most common followed by blood groups “B,” “A” and “AB” with a predominance of Rh positivity. In addition to compatibility test in blood transfusion practice, knowledge of the blood group distribution is also important for geographical information, genetic studies and for forensic studies in the population.

REFERENCES


How to cite this article: Chandekar AS, Gaythri PA, Heena MD, Nitin V, Gururaj VP. Distribution of ABO and Rh-D Blood Groups Among Blood Donors: Western India Data. Int J Sci Stud 2017;5(3):54-56.

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Image Acquisition Adequacy for Second Trimester Targeted Fetal Scans - A Clinical Audit

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Abstract

Introduction: Clinical audits are essential for health care quality assurance and improvement. Ultrasound has an important role in pregnancy, especially in foetal anatomical screening which is done between 18 and 22 weeks of gestation.

Aim: To audit image acquisition adequacy for targeted second trimester scans and to determine improvement after a few simple interventions.

Methods: Retrospectively audit the images of targeted scans performed over a period of one year, discuss the findings in an audit meet, recommend interventions to improve imaging adequacy and perform a re-audit after six months to document improvement.

Results: Initial audit showed that only 44.9% of studies had adequate acquired images as per guidelines, with higher percentage of scans performed by senior consultants being adequate. Proportion of scans with adequate image acquisition rose to 91.4% on re-audit.

Conclusion: Information regarding importance of adequate image acquisition and presence of easily accessible imaging checklist are effective ways to improve adequate imaging adequacy in targeted scans.

Key words: Anomaly scan, Clinical audit, Imaging quality, Rule of three, Ultrasound

INTRODUCTION

Ultrasound is a non-invasive medical imaging modality and relies on sound wave transmission and reflection of sound waves in tissues. In pregnancy, it has a very important role in generating images of the developing fetus which is used to monitor fetal development and screen for any abnormalities.1 In spite of its safety profile, the use of ultrasound in pregnancy should be used only for medical purposes, because of the potential for tissue heating.2,3 Ultrasound image in pregnancy is indicated for specific purposes in each trimester. In the first trimester, it is performed to evaluate the location, size and number of gestational sacs, yolk sac and cardiac activity of embryo. Second trimester scan is done between 18 and 22 weeks for detailed anatomical evaluation. Third trimester ultrasound is indicated for evaluating fetal growth, presentation, cardiac activity, placental abnormalities, and amniotic fluid volume.4,5

Among the indicated ultrasonographic ultrasound examinations in pregnancy, the second trimester targeted anomaly scan can be considered the most important, and a thorough anatomical examination of the fetus is warranted during this examination.6 The report was given for an ultrasound, and the images are a part of the patient medical record, and the number of images should be adequate enough to ensure that a necessary standard of examination has been carried out. A written or printed radiology report is a legal document, and the associated recorded images should be archived for purposes of documentation and medico-legal requirements.7,8

Guidelines state that widely published requirements for image acquisition should be followed. Various such...
standards are available, among which, the most widely followed in our region is the “rule of three” by Suresh and Suresh. It was made to extract maximum information from fetal anatomical ultrasound in the most time-efficient manner, and ensures satisfactory examination. It involves visualizing three anatomical structures in each section or part of the fetus and its environment.

**Aim**
The aim of this audit was to determine the adequacy of image acquisition for targeted second trimester scans in the radiology department of a tertiary care hospital and to determine improvement after a few simple interventions.

**Audit Standards**
“Rule of three” guidelines were used as a standard for image acquisition adequacy. Ideally, all studies should have all images acquired as listed in the guidelines. Proportion of scans which had recorded images of every particular plane of imaging mentioned in the imaging guidelines was used to measure extent of adequacy. The audit standards aimed for imaging planes were Around 100% for three planes of head, three sagittal spine aspects, transverse axis of spine, four chamber and three vessel views of heart, three planes of abdomen, proximal and distal segments of limbs, placental position, and transorbital facial view.

Outflow tract views of heart and facial views can be considered more difficult compared to the rest of the image planes, and heavily dependent on fetal position, and hence standard set was 90%.

Studies were conducted on patients with very high BMI precluding satisfactory fetus evaluation were excluded.

**METHODS**
This was a retrospective audit and images available in the picture archiving and communication system (PACS) of targeted scans performed over a period of 1 year from September 2015 to August 2016 were analyzed for adequacy in terms of percentage of studies with recorded specific imaging planes.

The results were discussed in a clinical audit meet. A presentation on the importance of adequacy of image acquisition with appropriate labeling and the widely used “rule of three” guidelines was made to all radiologists involved in the performance of targeted scans. “Rule of three” guideline pamphlets were made available near all ultrasound machines which were used to perform obstetric scans. Specific training about acquisition of specific cardiac and facial planes was given to all radiologists by a consultant obstetric sonologist. 30 min slots were allotted for anomaly scans. A re-audit was performed 6 months later to document improvement in image acquisition adequacy.

**RESULTS AND DISCUSSION**

**Initial Audit**
About 263 targeted scans were listed performed in radiology information system over the period of a year.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Plane</th>
<th>Audit standard (%)</th>
<th>Initial audit (%)</th>
<th>Re-audit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Trans thalamic plane</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Ventricular plane</td>
<td>100</td>
<td>76.1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Trans cerebellar plane</td>
<td>100</td>
<td>59</td>
<td>100</td>
</tr>
<tr>
<td>Spine</td>
<td>Three aspects of sagittal plane</td>
<td>100</td>
<td>57.4</td>
<td>100</td>
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<tr>
<td></td>
<td>Transverse plane</td>
<td>100</td>
<td>69.2</td>
<td>97.1</td>
</tr>
<tr>
<td></td>
<td>Coronal plane</td>
<td>Not a requisite</td>
<td>58.5</td>
<td>86.2</td>
</tr>
<tr>
<td>Thorax</td>
<td>Mid-thoracic plane</td>
<td>100</td>
<td>57.4</td>
<td>97.7</td>
</tr>
<tr>
<td></td>
<td>Four chamber view</td>
<td>100</td>
<td>80.6</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Three-vessel view</td>
<td>90</td>
<td>65.4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Left ventricular outflow tract</td>
<td>90</td>
<td>47.5</td>
<td>93.1</td>
</tr>
<tr>
<td></td>
<td>Right ventricular outflow tract</td>
<td>90</td>
<td>47.2</td>
<td>91.4</td>
</tr>
<tr>
<td>Abdomen</td>
<td>Upper abdomen trans-gastric</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Mid abdomen trans renal</td>
<td>100</td>
<td>65.7</td>
<td>97.7</td>
</tr>
<tr>
<td></td>
<td>Lower abdomen with Doppler showing two umbilical arteries</td>
<td>100</td>
<td>58.5</td>
<td>100</td>
</tr>
<tr>
<td>Extremities</td>
<td>Proximal segment - both sides femur and humerus</td>
<td>100</td>
<td>44.9</td>
<td>98.3</td>
</tr>
<tr>
<td></td>
<td>Midsegment</td>
<td>Not a requisite</td>
<td>45.6</td>
<td>96.5</td>
</tr>
<tr>
<td></td>
<td>Distal segment - upper limbs</td>
<td>100</td>
<td>57</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Distal segment - feet (either axial or sagittal)</td>
<td>100</td>
<td>55.1</td>
<td>100</td>
</tr>
<tr>
<td>Face</td>
<td>Trans orbital</td>
<td>100</td>
<td>62</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Nose - mid sagittal</td>
<td>90</td>
<td>58.5</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Nose and lips</td>
<td>90</td>
<td>51.7</td>
<td>96.5</td>
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<tr>
<td></td>
<td>Premaxillary triangle</td>
<td>90</td>
<td>45.6</td>
<td>94.0</td>
</tr>
</tbody>
</table>
from September 2015 to August 2016. All scans were performed between gestational periods of 17 weeks 4 days and 22 weeks 0 days. 128 scans were performed by senior consultants with more than 8 years of experience, 135 scans performed by junior consultants. 24 (9.1%) studies had only three images depicting biometry. 118 (44.9%) studies had all images present in them as per guidelines. Findings with respect to each imaging plane are shown in Table 1. 94.4% scans performed by senior consultants were adequate as per guidelines, while only 14.6% scans performed by junior consultants were adequate with respect to image acquisition.

**Re-audit**

Re-audit was done 6 months after the presentation of the initial audit. A total of 174 studies were analyzed. There was a significant improvement. Overall, 159 (91.4%) studies had adequate images stored in PACS, image section wise details are provided in Table 1. 100% and 86.3% of studies performed by senior consultants and junior consultants, respectively, had adequate images acquired as per guidelines, while only 14.6% scans performed by junior consultants were adequate with respect to image acquisition.

Radiologists in senior grade and better experience demonstrated better documentation responsibilities.

Three views - trans thalamic view, upper abdomen axial view, and femur view - are routinely taken for biometry (assessment of fetal maturation). Acquisition of additional views of fetal anatomy was found to be extremely variable in the initial audit. Trans ventricular view of head and four chamber view of heart were the most performed among them, and image representation of face, heart (except for four chamber view), spine and extremities were grossly inadequate. Image acquisition inadequacy does not always indicate inadequate scanning; however, availability of images can only be proof of optimal scanning.

It is common knowledge that ultrasound detects most of the fetal anomalies. Whenever there is birth of an anomalous baby, an inevitable question would always be whether it could have been detected antenatally. Excess of free information is available in the internet as to how ultrasound can be used to detect particular anomalies. This would raise the question why an anomaly was missed in an antenatal scan. In a medico-legal issue of such effect, evaluation of negligence relies solely on examination of available images. It is hence extremely important to not only image the fetus adequately but also to save appropriate images, document the findings, abnormalities and also document the reason whenever a structure could not be adequately assessed - persistent suboptimal fetal position precluding facial evaluation, for example. Various guidelines and checklists are available to ensure satisfactory fetal assessment.

“*Rule of three*” is an excellent method of making sure to perform a satisfactory and thorough scan and documentation of anatomical details of an intrauterine fetus in the least time. It is done ideally between 18 and 22 weeks of gestation. The “rule of three” guidelines are detailed in Table 2.

Evaluation of every plane and every structure mentioned has a specific significance in diagnosing or ruling out specific anomalies, and it is important in view of documentation and medico-legal aspects that each imaging plane mentioned be studied and saved. A considerable increase in the proportion of scans with complete documentation from 44.9% to 91.4% has been demonstrated in this audit.

**CONCLUSION**

Training regarding the importance of adequate imaging and method of scanning as per guidelines is a simple method of effectively increasing adequate image documentation.
Easily accessible pamphlets depicting the imaging checklist would be an effective reference that a radiologist can use during performance of a targeted scan without having to spend considerable time.

**RECOMMENDATIONS**

- Emphasizing the significance of documentation and medico-legal aspects of the radiological report and the associated images to all radiologists to encourage them to acquire and save adequate images.
- Training radiologists about the techniques of appropriate image plane acquisition for fetal anatomical assessment.
- Training radiologists about widely accepted guidelines for adequate image acquisition and making such guidelines readily available for reference during the performance of a scan.

**REFERENCES**

HER2/neu Expression in Gastric and Esophagogastric Junction Adenocarcinoma

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Abstract

Background: Gastric cancer is one of the most commonly diagnosed cancer and one of the most common causes of cancer-related deaths worldwide. HER-2/neu, a well-recognized factor, is indicated in the development of certain human solid tumors, notably breast cancer. High expression of HER2/neu has correlated with poor prognosis. Studies reveal combination of treatment with antibody targeting HER-2/neu protein (Trastuzumab) and chemotherapy significantly improves overall survival in patients with gastric and esophagogastric junctional (EGJ) adenocarcinomas with HER-2/neu protein overexpression. We aimed to investigate the frequency of Her2/neu expression and association with clinicopathological parameters in our gastric and EGJ adenocarcinoma series to make a contribution to the emerging data on this oncogene.

Materials and Methods: A total of 100 cases, including biopsy and resection specimens between November 2012 and December 2014, were selected. Her2/neu expression was determined by immunohistochemistry (IHC) on tumor tissues. Samples with IHC 2+ scores/equivocal cases were tested using fluorescent in situ hybridization (FISH).

Result: We found 8% positivity for HER2/neu protein expression (IHC 3+ and IHC 2+/FISH +). Gene amplification in 5 cases revealed 100% concordance with IHC 3+. The findings of our study are in concordance with international data. We also observed a relationship of intestinal phenotype, EGJ tumors, and well-differentiated adenocarcinoma with HER2 overexpression.

Conclusion: The findings of our study suggest a relationship of EGJ tumors, intestinal phenotype, and well-differentiated adenocarcinoma with HER2 overexpression.

Key words: Gastric adenocarcinoma, HER2/neu, Esophagogastric junction adenocarcinoma, Prognostic relevance of HER2/neu in gastric tumors

INTRODUCTION

Gastric carcinoma is one of the most common causes of cancer-related deaths worldwide, second after lung cancer. Genetic alterations of tumor suppressor genes and proto-oncogenes lead to gastric adenocarcinoma.¹²

Surgical resection is the mainstay of therapy for both gastric and esophagogastric junction (EGJ) carcinomas. However, the most patients are diagnosed in an unresectable stage.

For these patients, chemotherapy may prolong life, but survival rates remain low. Given the poor prognosis, and the fact that most gastric and esophageal cancers are diagnosed at an advanced or unresectable stage, new therapeutic strategies and treatment options and novel therapeutic targets are the need of the hour.³⁴

Overexpression of HER2/neu occurs in 10-34% of invasive breast cancer patients and it is associated with aggressive behavior, resistance to treatment with chemotherapeutics and poor response to endocrine treatment. HER2/neu overexpression has been observed in various types of cancers including colon, bladder, ovary, endometrium, lung, uterine cervix, head and neck, esophagus, and stomach carcinomas.³⁵

The prognostic role of HER2 overexpression in gastric cancer remains controversial.⁶
Predictably, however, patients with tumors have HER2/neu overexpression benefit from trastuzumab therapy. It is therefore essential to determine the HER2/neu status of tumors to use trastuzumab as an additional agent in treatment of related cancers.\textsuperscript{7,8}

**MATERIALS AND METHODS**

This hospital-based prospective study was conducted at the Kidwai Memorial Institute of Oncology, Bengaluru, South India. Patients diagnosed with gastric and EGJ adenocarcinoma cancer in our Institute as well as those referred from other hospitals from November 2012 to December 2014 were included in the study.

The study protocol was approved by the hospital's Institutional Review Board and Ethical Committee.

The clinical data in our study were limited due to the high percentage of patients lost to follow up attributable to various factors such as advanced stage of disease, apathy, and poor economic conditions among others.

For fresh specimens received in the laboratory, fixation in 10\% neutral buffered formalin for 6 to 48 h was ensured. The cases were initially evaluated by routine hematoxylin and eosin stained sections.

Based on histomorphology, the cases were categorized according to the WHO 2012 classification into well, moderately, and poorly differentiated adenocarcinoma and into intestinal, diffuse, and mixed according to Lauren's classification.\textsuperscript{9}

Histopathological, immunohistochemical (IHC), and \textit{in situ} hybridization studies were done on formalin-fixed, paraffin-embedded tissue blocks in the Department of Pathology, Kidwai Memorial Institute of Oncology, Bengaluru. Biopsy specimens were graded and also evaluated by alcian blue in cases with signet ring cell morphology for confirmation of the cell type. Blocks of biopsy specimens were also evaluated for adequacy of tumor tissue for IHC.

HER2 scoring was done in accordance with CAP/ASCO guidelines.

Samples with IHC 2+ scores/equivocal cases were tested using fluorescent \textit{in situ} hybridization (FISH).

**IHC (n = 100)**

A one step polymer-horseradish peroxidase detection system was used.

**Procedure**

3 \(\mu\) tissue sections on poly-L-lysine-coated slides were dewaxed, treated with an antigen retrieval solution, blocked with 2\% skimmed milk blocking solution and then incubated with the primary antibody. The primary antibody binds to the antigen of interest. This was followed by incubation with the secondary antibody conjugated with horseradish peroxidase polymer and color development using 3,3\'-diaminobenzidine substrate. When adequate color development was seen, the slides were washed in water to stop the reaction, counterstained with hematoxylin and covered with a mounting medium. The details of interpretation of the immunostaining are given in Table 1.

**Fluorescence in Situ Hybridization (n = 5)**

The standard operational protocol for FISH probe use of solid tissue was followed. The probe used was those of the PathVysion HER2/neu DNA probe kit which is FDA approved.

The results of FISH are expressed as the ratio between the number of copies of the HER2 gene and the number of copies of chromosome 17 within the nuclei counted in 20 cancer cells.

The definition of FISH positivity in gastric or EGJ cancer is an HER2: Chromosome 17 ratio of >2.0. The details of interpretation of the FISH are given in Table 2.

**Statistical Analysis**

Data collected were subjected to statistical analysis using “R” software (free download). Frequency tables were generated on clinical profile parameters. Correlation of HER2 expression with clinical parameters was done using Spearman’s rank coefficient \(\rho\). Any \(\rho\) value ≤0.05 was considered statistically significant.

**RESULTS**

Mean patient age was 53.57. Out of the 100 cases studied 64 were male, 36 female.

The distribution of cases by site included 72 cases with epicenter of the tumor in the stomach and 28 with epicenter of the tumor in the EGJ. A total of 76 of the 100 cases were of biopsy specimens and 24 of resected specimens were taken in the study.

Out of 100 cases, 57 were diagnosed with intestinal type and a subset of 43 patients were diagnosed with diffuse type, as per Lauren’s histological subtype. On the basis of degree of differentiation of the 100 cases, 5 were of Grade I, 50 of Grade II, and 45 of Grade III. In IHC examination,
90 of 100 cases were negative for HER2/neu expression (score 0) and 2 cases showed incomplete membranous staining in <10% of tumor cells, and they were scored as 1(+) (Figure 1). A total of 92 cases consisting of IHC score 0 and 1(+) were negative. A total of 5 cases revealed strong complete membranous staining in more than 10% of tumor cells (IHC score 3+) (Figures 2-4). In the rest 3 cases, there was weak to moderate staining of the entire or basolateral membrane staining in >10% of the tumor cells (IHC score 2+) (Figure 3). These 3 cases were scored as 2(+) IHC. FISH assay was carried out in all IHC 2(+) cases as per ASCO/CAP guidelines and also in 1 IHC 1(+) and 1 IHC 3(+) case (Table 3). All cases of IHC score 2(+) and the case of IHC 3(+) for which FISH was performed which showed gene amplification. The case of IHC 1(+) did not show gene amplification. After IHC and FISH results, the total HER2/neu positivity rate was 8 cases (8%).

Patient demographics and pathological tumor characteristics with respect to HER2/neu expression results in our study group are summarized in Table 4. Totally, 7 out of 8 of the HER2/neu positive cases (12.28%) tumors were of intestinal type gastric/EGJ adenocarcinomas, whereas 1 (2.32%) was of diffuse type adenocarcinoma. Three of 28 (10.71%) cases of EGJ adenocarcinoma were HER2/neu positive, with 5 of 72 (6.94%) cases of gastric tumors being positive. We did not find statistical significance in evaluating HER2/neu expression with Lauren's histological subtype ($P = 0.3469$) or site of the tumor ($P = 0.4479$). However, we noted a strong association with these variables, with approximately 5 times more positivity in intestinal tumors than diffuse type. Furthermore, we did not observe an association between patient age and gender with HER2/neu expression (Figures 6 and 7).

**DISCUSSION**

The incidence and mortality rates of gastric cancer are decreased worldwide, but despite the recent decline, gastric cancer remains the fourth most common cancer and the second leading cause of cancer-related mortality.\textsuperscript{12,13} In the recent years, interest has grown in understanding the relationship between the biological characteristics of gastric cancer and the association of these characteristics with the clinical outcomes of the disease (Figure 8). HER-2/neu a well-recognized factor is indicated in the development of certain human solid tumors, notably breast cancer. High expression of HER-2/neu has correlated with poor prognosis. Studies reveal combination of treatment with antibody targeting HER-2 protein (Trastuzumab) and chemotherapy significantly improves overall survival in patients with gastric and EGJ adenocarcinomas with HER-2/neu protein overexpression.\textsuperscript{14}
Table 4: Correlation of HER2 score with other variables

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HER2/neu score</th>
<th></th>
<th></th>
<th></th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 (%)</td>
<td>1+</td>
<td>2+</td>
<td>3+</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60 years (n=65)</td>
<td>58 (89.2)</td>
<td>2 (3.07)</td>
<td>2 (3.07)</td>
<td>3 (4.61)</td>
<td>0.9286</td>
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<tr>
<td>≥60 years (n=35)</td>
<td>32 (91.4)</td>
<td>0 (0)</td>
<td>1 (2.85)</td>
<td>2 (5.71)</td>
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<tr>
<td>Gender</td>
<td></td>
<td></td>
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<tr>
<td>Male (n=64)</td>
<td>59 (92.1)</td>
<td>1 (1.56)</td>
<td>1 (1.56)</td>
<td>3 (4.68)</td>
<td>0.7026</td>
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<tr>
<td>Female (n=36)</td>
<td>31 (86.11)</td>
<td>1 (2.77)</td>
<td>2 (5.55)</td>
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<tr>
<td>Type of specimen</td>
<td></td>
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</tr>
<tr>
<td>Biopsy (n=76)</td>
<td>68 (89.47)</td>
<td>1 (1.31)</td>
<td>3 (3.94)</td>
<td>4 (9.26)</td>
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<td>Resected (n=24)</td>
<td>22 (91.6)</td>
<td>1 (4.16)</td>
<td>0 (0)</td>
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<tr>
<td>Location of tumor</td>
<td></td>
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<td></td>
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<tr>
<td>Stomach (n=72)</td>
<td>65 (90.27)</td>
<td>2 (2.77)</td>
<td>1 (1.38)</td>
<td>4 (5.55)</td>
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<tr>
<td>EGJ (n=28)</td>
<td>25 (89.28)</td>
<td>0 (0)</td>
<td>2 (7.14)</td>
<td>1 (3.57)</td>
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<td></td>
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<tr>
<td>Intestinal (n=57)</td>
<td>49 (85.9)</td>
<td>1 (1.75)</td>
<td>3 (5.26)</td>
<td>4 (7.01)</td>
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<td>Diffuse (n=43)</td>
<td>41 (95.3)</td>
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<td>Mixed (n=0)</td>
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<tr>
<td>Degree of differentiation</td>
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<tr>
<td>Grade I (n=5)</td>
<td>4 (80)</td>
<td>0 (0)</td>
<td>0 (0)</td>
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<td>0.2428</td>
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<td>Grade II (n=50)</td>
<td>43 (86)</td>
<td>1 (2)</td>
<td>3 (6)</td>
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<td>Grade III (n=45)</td>
<td>43 (95.5)</td>
<td>1 (2.22)</td>
<td>0 (0)</td>
<td>1 (2.22)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Distribution of cases by HER2/neu score

Figure 2: Adenocarcinoma Grade I/intestinal differentiation, resected specimen, H and E (×40)

Figure 3: HER2/neu immunostains (×10): 3+ resected specimen

Figure 4: HER2/neu immunostains 3+, biopsy
Many studies have evaluated HER-2/neu status in GC, with ranges of HER2/neu positivity varying from 4% to 53%. However, fewer studies have been conducted in India to evaluate this prognostic marker. There has been considerable interest in HER2/neu as a prognostic marker. In our study, we assessed the HER2/neu expression pattern and correlated this with other histopathological features and available clinical data.

The type of specimen in our study included a higher percentage of biopsies (76%) versus surgically resected specimens (24%). In the ToGA trial, it was suggested that the type of specimen does not affect the IHC study for HER2/neu protein expression. In the study by Janjigian et al., there was no difference between HER2/neu positive rates between resection and biopsy specimens.

In our study, 8 of 100 cases (8%) of gastric and OGJ adenocarcinoma cases were positive for HER2/neu (IHC3+ and IHC 2+/FISH +). Takehana et al., Tereshima et al., Shan et al., Yildirim et al., Barros Silva et al., have reported positivity rates of 8%, 9%, 9.8%, 11.5%, 8%, and 9.3%, respectively, in their studies comparable with our study. Other studies have reported higher rates (Yk et al. 42%) and this variation may be explained by analytical limitations by fixation, sample size, number of intestinal, diffuse and mixed tumors, usage of different antibody clones, heterogeneous staining of tumor tissue, and also subjective testing by semi-quantitative IHC testing. Racial differences have not been reported in the ToGA trial. A study of subjects in the Indian population by Sekaran et al. showed positive rates of 44.2%.

A total of 5 of 8 patients who were HER2/neu positive were below the age of 60. No gender predilection was noted in our study with 4 cases of males and 4 female patients with HER2/neu positivity.

HER 2/neu positivity rates were varied by tumor site with higher rates of HER2/neu positivity in EGJ adenocarcinoma than in stomach cancer in this study (10.71% vs. 6.94%, respectively). This is consistent with the results of other studies for EGJ versus GC adenocarcinoma: Tanner et al. 24% versus 12.2%, Janjigian...
et al. 25% versus 18%, Shan et al. 14.6% versus 7% and in the ToGA trial 33.2% versus 20.9% (Table 5).

We noted a strong association of intestinal subtype with 7 of 8 positive cases displaying intestinal differentiation. Nearly, 12.28% of intestinal and 2.32% of diffuse tumors showed HER2/neu overexpression. This is in correlation with other studies who report a strong correlation of intestinal phenotype with HER2/neu expression compared to diffuse subtype: Tanner et al. (21.5% vs. 2.2%), Grasbach et al. (3.8% vs. 0%), Liu et al. (11% vs. 8%), Yildirim et al. (21.6% vs. 4%), and Janjigian et al. (33% vs. 8%) (Table 5).

FISH analysis for gene amplification was carried out in all IHC 2+ (equivocal) cases (3/3) and one IHC 3+ case (1/3) and one IHC 1+ case (1/2). All cases with score of IHC 2+ and IHC 3+ showed gene amplification. The case of IHC 1+ did not show gene amplification. The concordance rate between IHC and FISH was 100%. ToGA trial reports a concordance rate of 87.2% between IHC and FISH. Yk et al. reported an HER2 + rate by FISH of 20.3% and by IHC of 42%.

### REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.

### Table 5: Comparison of HER2/neu positivity with other studies

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Our study</th>
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FISH: Fluorescent in situ hybridization.
Prospective Study of Stab Injury of Abdomen

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Abstract

Background: Stab wound has been rising at a phenomenal rate and has become a source of worry for the society. Stab wound is more commonly encountered in urban population than rural.

Aims and Objectives: (1) Epidemiological study of stab wound abdomen, (2) to study the relationship between mode of injury, clinical presentation, and severity of injury, and (3) to study these cases in terms of hospitalization, operation, mortality, and morbidity.

Materials and Methods: A prospective study was carried out in patients of stab injury admitted to the Surgical Unit of Deen Dayal Upadhyay Hospital, New Delhi, over 1½ years from March 2009 to September 2010.

Results: In our study, stab wound of abdomen constituted 5.1% of all surgical admission over 18 months.

Conclusion: A total of 60 patients of stab injury abdomen were admitted and exploratory laparotomy was performed in around 35 patient and small bowel was most frequently injured viscous. With proper treatment, most patients make good recovery and can return to duty and useful occupation.

Key words: Abdomen, Exploratory laparotomy, Stab injury

INTRODUCTION

As we are becoming more and more civilized, (so they say) some of the hazards of civilization are becoming apparent, that is, road traffic accident, warfare, pollution, etc., Urbanization has had its toll with the increase of population and increasing competition in life along with a hard-hit economy. Some very primitive traits in the human being are coming up in the form of revenge which is basically physical with the intent of harming, threatening, or killing the victim.

Stab injury has become frequent in our society. It may be accidental or suicidal; also however, they also take a toll in deaths.

Of late, the incidence of stab injury has been rising at a phenomenal rate and has become a source of worry, not only for the society, law, and state but also for the hospitals, doctors who are ultimately involved in it. The patient has to be treated not only for the trauma but also the psychological aspect also has to be considered.

MATERIALS AND METHODS

The present study was conducted at the Deen Dayal Upadhyay Hospital, New Delhi, with the cooperation of the staff of: (1) Medicolegal section (2) Central record room and the help of the Resident.

This is a prospective study carried out for a period of 1½ years from March 2009 to September 2010.

The present study includes 60 cases of stab injury admitted to the Surgical Unit of Deen Dayal Upadhyay Hospital, New Delhi, over this period.

This study includes patient who reported to hospital with a history of stab injury (Chaku, Gupti Sword, and Arrow) and required hospitalization for further management.

Those patients who were discharged on the outpatient basis after minor repair in casualty are not included in this
study. The remaining patients who sustained fatal injuries and were resuscitated in causality and admitted to the wards and subjected to appropriate management.

Of these who were admitted, the records were collected from the central record room and the ward paper was also studied, that is, Residents note and operative interference were done. The ward patients were examined in the prospective study.

Cases studied comprised patients of stab injury with or without associated injury of any nature.

On admission to hospital patient’s name, age, sex, address, and registration number were noted. Date and time of admission was also noted. Detailed history of injury and time of injury were recorded.

Nature of weapon used was noted such as Chaku, Arrow, Sword, Gupti, and Broken glass piece.

If patient was conscious and not under the effect of any narcotic drugs or alcohol, his presenting complains were noted mainly pain, vomiting, distention of abdomen, and hematuria.

Exact site of injury was recorded according to the region mentioned, that is, head and neck, chest, abdomen, gluteal region, and limbs.

On admission to hospital, resuscitation and evaluation of injured patient began simultaneously. If patient was in state of shock often with internal injury or associated injury present, his cardiorespiratory status was assessed. Recording of vital signs was made immediately and in order of priority, establishment of adequate ventilation, control of major hemorrhage done. Insertion of large, one or more intravenous lines is accomplished and a blood sample dispatched to blood was done as required.

With respiratory and circulatory efficiency restored, vital signs recording continued at 15 min intervals. Detailed physical examination and local examination were then performed. Urinary catheter inserted for recording hourly output and urine sampling to evaluate integrity of urinary track. A Ryle’s tube inserted for nasogastric suction wherever necessary in abdominal injury.

Resuscitation was continued throughout the period of evaluation until a treatment plan, surgery, or observation was established.

The external injury was noted in detail and findings such as the presence of surgical emphysema and evisceration. Tenderness, guarding, rigidity in relation to abdominal quadrants, state of bowel sounds whether sluggish or absent, and profuse bleeding were recorded.

Details of associated injury were recorded. All patients with suspected stab injury to chest, abdomen, and gluteal region were subjected to following investigation, a complete blood count, hemoglobin, differential count, urine analysis chest X-ray, and abdomen X-ray in standing or sitting position. This may revealed (a) hemothorax, (b) pneumothorax, (c) hemopneumothorax, and (d) free gas under the diaphragm, accidental pathological finding which may be relevant to the diagnosis.

The patient having evisceration or profuse bleeding from suspected vascular injury was shifted to O.T. for immediate surgical exploration, immediately after resuscitation in casualty M.O.T. without shifting of the patient to radiology department for X-ray examination.

Abdominal paracentesis was another procedure which was done only in few cases of doubtful internal injury. It was not done in large number of cases because such injuries were explored for any possible visceral injury and those cases who showed diagnostic X-ray findings such as gas under the diaphragm.

It was also not done in those cases which showed no deterioration but on the contrary on serial examination showed improvement and these were the cases which were kept on conservative line of treatment form the beginning only.

Abdominal paracentesis was not performed in cases who presented with signs of shock and local abdominal signs, that is, hypoactive bowel sounds increasing area or degree of tenderness or rigidity extended to untraumatized areas or when finding exceeded those explainable by the known injury.

The decision for tube thoracostomy (I.C.C.) was taken when X-ray chest showed either hemothorax, pneumothorax, or hemopneumothorax.

When the decision for exploratory laparotomy was taken on the basis of following indications, the patients were prepared for same and the pre-operative management comprised proper amount and quality of intravenous fluids, blood transfusions, broad-spectrum antibiotics, nasogastric suction, and maintaining the input and output charts. Same steps were taken for the patients who were observed and other signs improved.
RESULTS

In Deen Dayal Upadhyay Hospital from March 2009 to September 2010, 60 patients of stab injury were admitted. The observations made on these patients in different perspectives are present in the table with discussion following them.

Table 1 shows the distribution of cases in various age groups. Highest number of cases is in the third decade. Maximum number (36.6%) of cases are from 11 to 40 years.

Table 2 shows the distribution of cases in various sex groups. There were 57 male (95%) and 3 female (5%).

Table 3 shows that 47 patients (78.33%) came to hospital within 6 h of injury. Only 13 number of patient came to the hospital after 6 h of injury.

This duration of injury has been recorded from the OPD. Slip of the patient or by the direct enquiry made from patient.

Table 4 shows that Chaku was the most common weapon used for stabbing. The next most common weapon used was arrow.

Table 5 shows that 63.3% of patients came with single stab injury abdomen and 36.6% of patients came with multiple stab injury abdomen.

41.6% of patients came with associated injury (chest, face, upper and lower limb) 5% of patients came with evisceration.

Table 6 shows gastrointestinal tract injury was the most common among it. Ileal (16%) was most common with gastric tear (10%) next common. Among solid organ injury, spleen and liver show same incidence (5%) of injury each.

Table 7 shows 36.6% of patients required exploratory laparotomy and simple repair of perforation. 6% of cases required resection and anastomosis. 6% of cases required ICTD.

Vascular repair, splenectomy, and colostomy were done less frequently.

Table 8 shows that the wound infection and burst abdomen were the most common complications 8% each.

Other complications were less frequent.
Table 9 shows that 40% of cases required hospital stay for 1-3 days (conservative management).

28.5% of cases required 7-12 day (operated cases). 25% of these cases required 4-6 day hospitalization. Only 6.6% of cases required more than 12-day hospitalization.

**DISCUSSION**

One of the most baffling problems of surgery can be a patient suspected of having stab injury that requires surgical intervention as a life-saving measure. Surgeon would admit the difficulties of the diagnosis and the anxieties, frequently associated with the treatment of such injuries. After analyzing the given data, we are now in a position to discuss the factors which are important in the causation, diagnosis, treatment, morbidity, and mortality in stab injury cases.

1. In this study, stab injury cases accounted for 6.1% of total admission on surgical side. Incidence of this nature is more obvious in a civilian institution like ours in this country. People often try to settle interpersonal relationship and political problems by means of stabbing.

2. In our opinion, the incidence what our present series reflects is directly related to geographical cultural and social factors of the particular community.

3. In the present series, maximum number (83.3%) of patients was in the age group of 11-40 years and highest number (36.6%) of cases is in the third decade (21-30 years). The next most common decade was second decade (11-20 years) which comprised 26.6% of cases. This shows that young lads of educational institutions and various industrial and business institutions are more exposed to violence. In a study of 403 cases of stab wound were in the age group of 20-40 years while the age range was 13-74 years.

4. In the present series, male patients constitute about 95% and only 5% of cases were female. This shows that females are not subjected to stab injury. The males are the victims of a fight for money, land, women, alcohol intoxication, and in some cases very trivial reason. There were a few who get involved in trying to save other people. The females were mostly victims of home quarrels.

5. In a study at Mt. Sinai Hospital New York, 83.6% of cases were male. There is preponderance of male patients in practically all published series as reported by Ballinger et al. and similar incidence was observed in the USA.1

6. In this series, various weapons are used for stabbing, but knife (Chaku) is the most common being used in 81.6% of cases and arrow in 11.6% of cases. Incidence of this nature is more obvious because assault by stabbing is much more common in this part of the country. Stabbing by Chaku is explainable by the fact, that it is easily available, and especially the firearms are less readily available to low- and middle-class strata in our country. And also, because no license is needed to carry a Chaku of <6 inch. In a study carried out of Sinai Hospital, New York, 94% were homicidal wound and in 90% of cases, blades were used.

7. In our series, 78.3% of cases reported to hospital within 6 h of injury, whereas other stab injury patients who reported more then 6 h of injury were those who were referred from different peripheral health centers. In a study conducted at Sinai hospital, New York, 95% of stab injury patients reported to hospital within 3 h of injury. Those patients who came directly to the hospital were within 1-3 h of injury but those brought by police took longer time and arrived after 3-6 h of injury.

8. In this series, stab wounds over abdomen were most common, that is, 50% of cases, whereas second most common site was stab wound over chest seen in 47% of cases. Stab wounds over limbs were seen in 31% of cases. Melby and Denny in a study of 399 patients of stab injury reported following incidence: Abdomen - 12%, chest - 14%, and limbs - 35%. The figures in our observation differs mainly on the ground that our study included only those cases of stab injury who required hospitalization (suspected complicated injury) for further management, whereas a large number of patients were treated as outpatients.
stabil injury cases managed on O.P.D. basis only are not included in this study.  

9. In our series, 63% of cases had single stab wound and among the stab wound over the abdomen, about 36.6% of cases had multiple abdominal stab wound. Wilder and Kudchadkar in 1980 reported that 15% of cases had more than one stab wound over abdomen. 

10. In this study, the incidence of stab wound in relation to various anatomical areas of the body revealed that left back of chest, left lumbar region, left gluteal region, and left upper limb were more commonly involved. Hence, aforementioned incidence showed that left-side stab wound is much more common than the right side because most of the right-handed people are more likely to hit the left half of the body and most of them having been hit from sides or behind, and more common upper limb injury were probably caused by defensive action. Jones et al. reviewed that out of 35% of upper limb stab, 60% are in left arm. 

11. In this series, out of total complicated injury, visceral injury complication was most common, that is, 59% of total stab wound of abdomen. Sanbrasage in 1977 had reported 30-40% incidence of visceral injury in stab wound of abdomen. de Maynard and Oropeza in a study of 46 patients of abdominal stab reported that 87.4% had injury of intra-abdominal organs. Jarvis et al. in a study of 105 patients found, 37% of the cases had multiple organ injuries. 

12. In our series, Roentgenography was necessary to exercise judgment in diagnosis and treatment of stab injury cases. Wilder and Kudchadkar in 1971, reported that X-ray confirmation for exploration in stab wound of abdomen was disappointing and time-consuming. The negative finding may Lull the surgeon into false sense of security. 

13. About 6% of cases of stab injury chest required intercostal drainage studies. 

14. Ordog et al. in 1994, reported in a study of 4, 106 cases of stab injury chest that 88% were treated conservatively 10% required intercostals drainage and 2% required thoracotomy. 

15. Among stab abdomen, 45% of cases required exploratory laparotomy, whereas incidence of negative laparotomy (non-therapeutic laparotomy) was 4.5%, Koseki in 1974 reported that nearly one-third of abdominal stab wound never penetrated the peritoneum and half of those that entered never needed any surgical treatment. Wilder and Kudchadkar in 1971 reported the incidence of negative laparotomy to be 25% in stab injury case. 

16. de Maynard and Oropeza reported that out of 46 cases of stab abdomen, 84.7% required exploratory laparotomy and 10.8% had negative laparotomy. 

17. On analysis of various internal organ injury, small bowel injury was most common, that is, 27% of cases. Rodkey in 1968 reported the incidence to be 8%. The majority of authors have found that the jejunum and ileum are most commonly injured (Davis 1976). From the above incidence, it is evident that small bowel is most frequently injured because it occupies a large portion of the abdominal cavity. 

18. Among the solid organs, liver injury was most commonly seen, that is, 6% of cases. Incidence of liver injury reported in 30% cases of abdominal stab injury by Amerson and Ston in 1970. Elerding et al. in 1979 reported that more than 85% of liver injury are minor and can be managed by simple repair and drained. 

19. Heyns and Van Vollenhoven in 1992 reported that average duration of hospital stay was 3 days in conservative groups and 10 days in surgical group. However, in our series, average hospital stay was 3-6 days in conservative group and 10-12 days in surgical group. 

20. In the present series, the most common complications were wound infection 8% and burst abdomen 8% of cases which was of a very minor nature as it only delayed the hospital stay of the patient. Not accounting the wound infection as a post-operative complication, other complications were fecal fistula, jaundice, and pelvic abscesses are not common. 

CONCLUSION 

Following conclusion have been arrived as a result of the present study. 

1. Stab wound has been rising at a phenomenal rate and has become a source of worry for the society. Stab wound is more commonly encountered in urban population then rural. 

2. Males in third decades of life are the most vulnerable group. 

3. Management of all the patients has been carried out according to the accepted principal, that is, early resuscitative measures and operation as when necessary. 

4. There is a definite role of conservative management in these patients, whereas clinical features and investigations do not reveal any intestinal perforation or ongoing bleeding, therefore saving a negative laparotomy and its complications. 

5. In this series, the conservative treatment was done successfully in 50% of cases. 

6. The most common cause of prolonged hospitalization is high incidence of wound infection. 

With proper treatment, most patients make good recovery and can return to duty and useful occupation.
REFERENCES


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Epidemiological and Clinical Study of Scorpion Envenomation in Patients Admitted at Rims Teaching Hospital, Raichur

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Abstract

Objectives: The objectives of the study were to describe both epidemiological and clinical manifestations following scorpion envenomation and to define simple predictive factors which can be used in routine clinical practice as an indicator of poor prognosis and to evolve preventing measures.

Materials and Methods: It was a retrospective descriptive study in which a total of 33 cases of scorpion envenomation who were admitted during the defined study period of 2009 to 2014 (5 years) were included in the study. The case records were collected, tabulated, and analyzed.

Results: About two-thirds of the cases were males (63.6%). Occupation of about half of the cases were coolies. More than half of the cases (57.5%) were from rural area. House was the most common place of bite (66.7%) followed by fields. In two-thirds of the cases, the bite was by black scorpion. Most of the cases presented with pain at the site of bite. Signs such as bradycardia, drowsiness and few cutaneous manifestations, hypotension and hypertension were observed. The patients were treated symptomatically and prazosin. The duration of stay varied from 1 to 5 days.

Conclusion: Scorpion sting was seen more in labor class people and also in students. And also in people living in rural area where there are problems of poor housing conditions. Administration of prazosin at an interval of 3 h prevents the development of complications and probably leads to rapid recovery.

Key words: Black scorpion, Prazocin, Symptoms, Red scorpion, Scorpion envenomation

INTRODUCTION

Scorpion envenomation is a major public health problem in India. Scorpion envenomation causes significant morbidity and mortality remains high especially in rural areas due to delay in hospitalization due to prevailing superstitions and faith in village healers.¹ There are nearly 100 species of scorpion worldwide. Among 86 species present in India, Mesobuthus tumulus (Indian red scorpion) and Heterometrus swammerdami (black scorpion, formerly palamneus) are of medical importance.² The scorpion venom is a water soluble, antigenic, complex mixture of neurotoxin, cardiotoxin, nephrotoxin, hemolysin, phosphodiesterases, phospholipases, hyaluronidases, histamine, and other chemicals.³ Although local symptoms including severe pain and burning sensation at the site of sting are the most common symptoms, systemic manifestations can ensure. Cardiovascular complications are particularly prominent following stings by Indian red scorpion.⁴ All these manifestations are due to autonomic storm, mixture of both cholinergic, and adrenergic manifestations.⁵ Although adults are more frequently concerned, children experience more severe envenomations and mortality is higher among them. Improvement of therapeutic management would shrink the lethality very considerably.⁶ Morbidity and mortality due to scorpion sting result from acute refractory pulmonary edema, cardiogenic shock, and multiorgan...
failure. Opinions vary about the right treatment for scorpion sting. In the past different regimens, including a lytic cocktail, insulin, atropine, β blocker, nifedipine, and captopril have failed to reduce morbidity and mortality, but since the advent of the α1 blocker prazosin the fatality rate has been reduced to 1%. Scorpion envenomation could be classified as mild, moderate, and severe, and the therapeutic approach was based on the case severity. The treatment of the patients comprised 3 components: Symptomatic treatment, supporting vital functions, and injection of antivenom. The time that elapsed amid the sting and administration of the correct medical care was extremely essential to the patient’s prognosis.

The objectives of the study were to describe both epidemiological and clinical manifestations following scorpion envenomation and to define simple predictive factors which can be used in routine clinical practice as an indicator of poor prognosis and to evolve preventing measures.

MATERIALS AND METHODS

This study was conducted in Teaching hospital of Raichur Institute of Medical Sciences, Raichur. This is a retrospective descriptive study of the case records of the patients admitted with the history of scorpion envenomation. Approval from the Institutional Ethical Committee was obtained before conducting the study.

Records of all the patients irrespective of age, gender, and places who were admitted with the history of scorpion envenomation during the period of 1st January 2009 to 31st December 2014 (5 years) were included in the study. A total of 33 cases of scorpion envenomation were admitted during the defined study period of 2009 to 2014. All these were considered for the study.

The sociodemographic details such as name, age, gender, address, occupation, and the details about the scorpion envenomation such as time and place of bite, site of bite, history of first aid and the details of history, examination, and treatment were collected from the hospital records. The data were collected and were entered in excel sheet. The data were analyzed using SPSS version 20.0 (trial). Categorical outcomes were summarized by rates. Numerical outcomes were summarized by mean and standard deviation.

RESULTS

The study was a retrospective descriptive study conducted in Teaching Hospital of Raichur Institute of Medical Sciences, Raichur. A total of 33 cases were included in the study as that was the total number of admitted cases with the Scorpion sting during the study period.

The mean age of the study subjects was 21 ± 10.7 years, and the range was 7-40 years. The majority of the patients were adults more than 18 years (69.7%).

A total number of males were 21 (63.6%) and there were 12 females (36.4%). Out of total 33 study participants, majority were coolies (48.5%), followed by students (39.4%), homemakers (6.1%), and farmers (6.1%). When the place of residence was classified, more than half of the patients were 57.6% were from the rural area and 42.4% were from the urban area (Table 1).

In the present study, the majority of the patients were envenomated in their houses (66.7%), followed by fields (27.3%) and 2 of them had the bite in school (6.1%). When categorized according to the time taken to take the patient to the hospital, only 2 (6.1%) of them reached hospital in <1 h and most of them reached after 1 h of bite (93.9%). In our study, 12 (36.4%) people were bitten on their arm, 10 (30.3%) on foot or toes and 5 (15.2%) on their hands or fingers. Two-thirds of the individuals were bitten by black scorpions and one-third by red scorpions. Pain at the site of sting was present in most of the patients (93.9%) followed by sweating (33.3%) and palpitation (27.3%) and only two individuals (6.1%) presented the symptoms of abdominal discomfort (Table 2).

The clinical examination findings and the treatment given were also collected and analyzed. Bradycardia was seen in 23 (69.7%) patients, hypotension in 10 (30.3%), and hypertension in 12 (36.4%) patients. Tachypnea was seen in 16 (42.4%) patients. No abnormality was found in systemic examination except two patients were found to be disoriented during nervous system examination. Investigations such as complete blood counts, urine routine, and electrocardiogram were found to be normal.
in all the cases. Mean duration of stay was 2.1 ± 1.44 days. Range of stay was 1-5 days. Majority of the patients stayed in the hospital for 1 day (54.5%), followed by 5 patients (15.2%) for 2 days, 2 (6.1%) for 3 days, 5 (15.2%) for 4 days and 3 (9.1%) for 5 days (Table 3).

Cutaneous findings such as erythema, ulcer, necrosis, and ecchymosis in scorpion stung children were also recorded in this study.

We compared the time between the bite and time of reaching the hospital and duration of stay in the hospital and it was found to statistically significant (Chi-square: 76.963, \( P < 0.0001 \)). The duration of stay in case of bite from a red scorpion was longer compared to bite of black scorpion and it was found to statistically significant (Chi-square: 9.6, \( P = 0.04 \) or \( P < 0.05 \)). The duration of stay was longer in patients coming from the rural area than urban area and it was statistically significant (Chi-square: 18.262, \( P = 0.003 \) or \( P < 0.005 \)). We also compared administration of Prazosin and duration of stay in the hospital, but statistical significance could not be established (\( P = 0.297 \)). Hypotension was seen more in patients <18 years old and it was found to statistically significant (\( P < 0.0001 \)).

**DISCUSSION**

Scorpionism is a prevalent event in the tropical regions. Most of the patients were males (63.6%) and 36.4% were females. This rate is accordance with results of Dehghni *et al.* 2010.14 Dehghni *et al.* in Kashan that they reported that the scorpion stung people were males (53.04%) than females (46.95%). However, it is not consistent with the results of Vaziriznzadeh *et al.* (2008) in Khuzestan who reported more number of females than males. It is due to different methods and geographical locations in the two studies.

The results of this study approved that only 42.4% of scorpion stung people have been recorded in urban area which differs from the study done by Vaziriznzadeh *et al.* which reported that the most of the patients who referred to Ahvaz hospitals regarding scorpion stings had been stung by scorpions in urban area.15

In a study done by Mahaba, the severity of symptoms and signs after scorpion stings are significantly more among infants than adults and the treatment seems to be more essential in children than in adults. The severity of signs among hospitalized children in this study agrees with the results of the above said study which mentions that the greater number of stings to the head, neck, and body among the children because of poor withdrawal reflex when suffering from a sting gives a chance to scorpions injecting more venin.16 Cutaneous findings such as erythema, ecchymosis, ulcer and necrosis among scorpion stung children, were also recorded in this study which is in agreement to the findings of Radmanesh.17 The results of the current study are also in agreement with a study done by Pipelzadeh *et al.*,18 which states that 41% of the bites occurred in the lower extremities.

In a study done by Bawaskar and Bawaskar, 619 patients with severe envenomation, hypertension was noted in 55%, pulmonary edema in 27% and hypotension in 18%; all

### Table 2: Distribution of study participants according to history and chief complaints

<table>
<thead>
<tr>
<th>History and chief complaints</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of bite</td>
<td></td>
</tr>
<tr>
<td>House</td>
<td>22 (66.7)</td>
</tr>
<tr>
<td>Field</td>
<td>9 (27.3)</td>
</tr>
<tr>
<td>School</td>
<td>2 (6.1)</td>
</tr>
<tr>
<td>Time taken to reach hospital</td>
<td></td>
</tr>
<tr>
<td>Less than 1 h</td>
<td>2 (6.1)</td>
</tr>
<tr>
<td>More than 1 h</td>
<td>31 (93.9)</td>
</tr>
<tr>
<td>Site of bite</td>
<td></td>
</tr>
<tr>
<td>Foot/Toes</td>
<td>10 (30.3)</td>
</tr>
<tr>
<td>Leg</td>
<td>3 (9)</td>
</tr>
<tr>
<td>Hand/Fingers</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>Forearm</td>
<td>3 (9.1)</td>
</tr>
<tr>
<td>Arm</td>
<td>12 (36.4)</td>
</tr>
<tr>
<td>Type of Scorpion</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>22 (66.7)</td>
</tr>
<tr>
<td>Red</td>
<td>11 (33.3)</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>31 (93.9)</td>
</tr>
<tr>
<td>Sweating</td>
<td>11 (33.3)</td>
</tr>
<tr>
<td>Palpitation</td>
<td>9 (27.3)</td>
</tr>
<tr>
<td>Abdominal symptoms</td>
<td>2 (6.1)</td>
</tr>
</tbody>
</table>

### Table 3: Distribution of study participants according to the examination and treatment

<table>
<thead>
<tr>
<th>Examination and treatment</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse rate</td>
<td></td>
</tr>
<tr>
<td>Bradycardia</td>
<td>23 (69.7)</td>
</tr>
<tr>
<td>Normal sinus rhythm</td>
<td>10 (30.3)</td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
</tr>
<tr>
<td>Hypotension</td>
<td>10 (30.3)</td>
</tr>
<tr>
<td>Normotension</td>
<td>11 (33.3)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>12 (36.4)</td>
</tr>
<tr>
<td>Medications</td>
<td></td>
</tr>
<tr>
<td>IV fluids</td>
<td>26 (78.8)</td>
</tr>
<tr>
<td>Pain management</td>
<td>21 (63.7)</td>
</tr>
<tr>
<td>Local anesthesia</td>
<td>15 (45.5)</td>
</tr>
<tr>
<td>Injection TT</td>
<td>16 (48.5)</td>
</tr>
<tr>
<td>Prazocin</td>
<td>28 (84.8)</td>
</tr>
<tr>
<td>Duration of stay (days)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>18 (54.5)</td>
</tr>
<tr>
<td>2</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>3</td>
<td>2 (6.1)</td>
</tr>
<tr>
<td>4</td>
<td>5 (15.2)</td>
</tr>
<tr>
<td>5</td>
<td>3 (9.1)</td>
</tr>
</tbody>
</table>
patients recovered with oral prazosin. The results of our study are similar to this study except for the fact that, in the present study, we did find any case of pulmonary edema.

Since the antivenom is not supplied by the government, it was not used in the present study; however, several studies support the fact that antivenom is not must in every case of scorpion sting. Antivenom which is species specific is desirable to neutralize venom; however, prazosin, by correcting disturbed metabolism and antagonizing sympathetic over activity, is efficient against envenomation by several scorpion species. Although the rapid recovery in patients treated with antivenom is an advantage, the total cost of treatment with antivenom approaches a month’s salary for a laborer in the region.

CONCLUSION

Scorpion sting was seen more in labor class people and also in students. And also in people living in the rural area where there are problems of poor housing conditions, over crowding and insanitary methods of waste disposal. Scorpion envenomation is classified into mild, moderate and severe. The therapeutic approach was based on the case severity. The treatment comprised 3 components: Symptomatic treatment such as pain management and local anesthetics, vital functions support, and administration of Prazosin. Moreover, the time that elapsed between the sting and administration of the appropriate medical care is extremely important to the patient’s prognosis. Prazosin is a known antidote to Mesobuthus tamulus venom. Administration of prazosin at an interval of 3 h prevents the development of complications and probably led to rapid recovery.

LIMITATIONS

Since the study is a retrospective descriptive study done in a hospital set up, only the patients who approached the hospital are considered in the study. Many of the people stung by scorpion go for local remedies since they are not aware of the complications of severe envenomation.

REFERENCES

Role of Health Care Workers During Emergency Preparedness in Selected Hospitals of Navi Mumbai

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Abstract

Introduction: Health services being the most crucial service from the point of view of caring and rehabilitation of injured patients. Medical Facilities for patients care, requires the highest state of preparedness around the clock all 365 days. As hospitals and emergency staff are the first persons to manage the consequences of any disaster, assessment of their preparedness, as well as the infrastructure facility is most important in public interest. Keeping this view in mind, the current research is an attempt, undertaken to ascertain how prepared are the hospitals to manage disasters, both natural and man-made.

Materials and Methods: This is a cross-sectional study. Qualitative research methods were used to gather data and gain an understanding of the attitudes, perceptions, and practices of healthcare workers regarding hospital emergency and disaster preparedness. This enabled to gain an insight into the nature of the Hospital emergency preparedness process. The research also looked at numerical descriptions through quantification of the differences in the knowledge, attitudes and practices of healthcare workers concerning hospital emergency and disaster preparedness, thereby utilizing quantitative research methods.

Results: The results indicate a positive attitude towards the disaster planning process by the majority of respondents to fig for future emergency situations. There was little confidence that the hospital would take care of their medical needs. There is a need for regular workshops and training related to disaster preparedness, to be imparted to the healthcare workers who had a positive attitude towards training and education in disasters and emergencies.

Conclusion: There were policies that governed emergency and disaster preparedness at various hospitals. However most of the laws are under work in Progress category. Hence for paradigm shifting, developing countries like India needs to have positive insight & planning like advance countries around the globe to handle emergency situations.

Key words: Disaster, Health care workers, Emergency Preparedness

BACKGROUND

The World Disasters Report 2015 reported an increase of 60% disasters events in the last decade (2004-2014). In addition, the number of reported deaths increases from 600000 to 1.2 million globally. Emergency preparedness is a long-term community preparedness activity. The objective is to increase the overall capacity of a country to manage efficiently all types of emergencies ensuring appropriate systems, procedures and resources. To provide timely effective assistance to disaster victims to facilitates relief measures and rehabilitation of services. Disaster management includes four stages which include; prevention (mitigation), preparedness, response, and recovery. Health care workers have unique skills for handling all aspects of disasters. It includes assessment, priority setting, collaboration, and addressing both preventive and acute care needs.

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Preparing for disaster is very essential and vital priority for everyone in every discipline for dealing with emergency situations. Health care workers have a significant role to play in terms of emergency or disaster preparedness.

Research Study Objectives
1. To study the role of health care workers during emergency preparedness in selected hospitals of Navi Mumbai.
2. To examine the policies and plan governing emergency and disaster preparedness at selected hospital.
3. To study disaster preparedness among hospital health care workers at various levels.
4. To verify their knowledge, attitudes, practices, and awareness of their roles as per hospitals emergency preparedness plan.

Hypothesis
- Null hypothesis: \( H_0 \) – Selected hospitals are adequately prepared to face any kind of disaster, eventually involving a large number of causalities and injuries requiring immediate care.
- Alternative hypothesis: \( H_{\alpha} \) – Selected hospitals are not adequately prepared to face any kind of disaster, eventually involving a large number of causalities and injuries requiring immediate care.

METHODS

Study Design
This is a cross-sectional descriptive survey carried out between June and September 2016.

Study Population
The study population for this study includes all the health care workers working in selected hospitals in Navi Mumbai region.

Data Collection Tools
A total of 120 structured questionnaires were distributed to all the health care workers in selected hospitals the questionnaire was divided into five sections, A, B, C, D, and E. Where in Section A contained the sociodemographic data of the participants, Section B constitutes the understanding of the emergency preparedness. Section C focus on the role of health care workers during an emergency, Section D constitutes opinions of the participants on emergency tools, and Section E on factors affecting emergency preparedness.

Data Analysis and Management
Data collected from participants were coded and given a score out of 10 in Excel sheet. Which was statistically presented using graphical tools.

Ethics
Worded informed consent was obtained from an individual participant after permission to conduct the study was obtained from the study hospitals.

RESULTS

Participants Sociodemographic Features

Demographic characteristics
It provides a description of the demographic characteristics of the study participants based on the questionnaire, which was distributed. This section looks at the gender, age, education level, duty station, work experiences, and this position held by the respondents. The age distribution of the respondents is shown in Table 1.

In Figure 1, most of the respondents were in the 20-30 age group (35%). The 31-40 age group contributed to 26% of the respondents, while those in the 41-50 age group were 21% and those in the 51-60 age group were 18%.

Respondents were asked how many years they had worked in their current position and the result is summarized in Table 2.

![Figure 1: The age distribution of the respondents](image)

**Table 1: Distribution of respondents by age**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>35</td>
</tr>
<tr>
<td>31-40</td>
<td>26</td>
</tr>
<tr>
<td>41-50</td>
<td>21</td>
</tr>
<tr>
<td>51-60</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 2: Work experience**

<table>
<thead>
<tr>
<th>Position</th>
<th>1-10 years %</th>
<th>≥10 years %</th>
<th>Grand total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical superintendent</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Administrator manager/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>facility director</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Security in charge</td>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Fire safety officer</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Nursing in charge</td>
<td>0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Nurse - (causality)</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>Nurse - (general)</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>Nurse - (ICU)</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>Nurse - (maternity)</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Laboratory scientist</td>
<td>50</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>Sweeper 1</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Sweeper 2</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Grand total</td>
<td>54</td>
<td>46</td>
<td>100</td>
</tr>
</tbody>
</table>
As shown in Table 3 of Figure 2 most of the respondent worked in hospital wards (29%) mostly nurses, ward boys are following in this category, followed by outpatients department (OPD) (16%), then casualty (15%). Those working in casualty and OPD would be more when disaster will take place. The other duty station respondent represented was operation theatre (12%), laboratory (9%); cabins (6%), pharmacy (4%), ICU (3%) and other category is 22% which included the cabins, medical superintendents office, security in charge office, fire safety control rooms, housekeeping rooms, etc.,

<table>
<thead>
<tr>
<th>No.</th>
<th>Duty Station</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ward</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>Outpatients Department /OPD</td>
<td>16</td>
</tr>
<tr>
<td>3</td>
<td>Causality</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>Operation Theatre</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Laboratory</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Cabins</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Pharmacy</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>ICU</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Other</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
<td>Grand Total</td>
<td>100</td>
</tr>
</tbody>
</table>

**Figure 2: Duty station of the staff category**

As per Table 4 of Figure 3, the highest level of education of the respondent is shown in Table 4, namely, 30 nos. (59%) of the respondents had diplomas as their highest level of education. These are in the category of nurses, pharmacist, laboratory attendant, etc. Those who had attain postgraduate degree level is 14 nos. (27%) respondents followed this. The respondent in this category is medical superintendent, administrator/facility director, security in charges, matron, etc. Those who were undergraduate were 4 nos. (8%), higher secondary and secondary school certificate respondent were 3 nos. (6%). None of the respondents was in the “no schooling” category. There was no respondent with only primary school level.

<table>
<thead>
<tr>
<th>Education</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>14 (27)</td>
</tr>
<tr>
<td>Diploma</td>
<td>30 (59)</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Total</td>
<td>51 (100)</td>
</tr>
</tbody>
</table>

**Figure 3: Highest level of education**

The respondent was asked whether they were aware of any disasters that occurred in their area in the past 5 years. This was done to assess their knowledge on disasters and to find out whether they would concur with the disaster risk profile of the hospital presented in Table 5. The results are shown in Table 5.

Most of the key respondents (85%) indicated that they were of the disasters that occurred in their area in the past 5 years. All of the above staff categories had a greater percentage as compared to those who knew about it than those who did not know (for example of the Medical superintendent who completed the questionnaire, 88% indicated that they were aware of the disaster happenings. While 12% of them were not aware since they have joined recently). The respondent was asked to list down the disasters that occurred in the area. The disaster by the respondents includes dengue, malaria, and motor vehicle accidents on roads. Furthermore, fire incidences were reported on a higher scale.

The respondent was asked to list disasters that are likely to occur in their hospitals. The disasters listed by most of the respondents included motor vehicle accidents, disease epidemics, and fire occurrences. Some of the respondents included chemical explosions at a factory in nearby area as possible cases of disaster that could occur in the region.

<table>
<thead>
<tr>
<th>Disaster awareness</th>
<th>Are you aware of any disasters that occurred in your area in past 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current position</td>
<td>Yes %</td>
</tr>
<tr>
<td>Medical superintendent</td>
<td>88</td>
</tr>
<tr>
<td>Administrator/facility director</td>
<td>80</td>
</tr>
<tr>
<td>Security in charge</td>
<td>95</td>
</tr>
<tr>
<td>Fire safety officer</td>
<td>92</td>
</tr>
<tr>
<td>Nursing in charge</td>
<td>100</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>67</td>
</tr>
<tr>
<td>Laboratory scientist</td>
<td>71</td>
</tr>
<tr>
<td>Average</td>
<td>85</td>
</tr>
</tbody>
</table>
Some of the respondents included chemical spill as a possible disaster that could occur in the region. The reason behind is proximity of the hospital to the main national express highway which was used by heavy vehicles carrying harmful chemicals and gases. This means that the respondents had the knowledge of hazards that may affect the hospital.

**Health Care Worker Defined Roles in Emergency Preparedness**

It is a coordinated effort that requires a multidisciplinary approach, cooperations and participation of all sectors. It is a process of planning and preparation before a disaster event. It is a process that equips individuals with plans and resources that will ensure personal and family safety in a disaster event.

**RECOMMENDATION**

1. Training is essential on periodic intervals at staff level at every hospital.
2. Tools should be provided to hospital staff at all level to handle emergency situations.
3. Disaster management support should be from TOP down approach at all senior levels of management.

**CONCLUSION**

Disaster preparedness helps in the safe management of disaster practices in future. It decreases vulnerability and risk to individual and properties. The role of health care workers plays a key role in handling emergencies.

**Study Limitation**

The study was conducted in selected hospitals of Navi Mumbai. Finding of this study are confined to this region and cannot be generalized.

Comparison of Tear Film Break-up Time with Schirmer’s Test with Anesthesia to Detect Tear Film Abnormality in Patients with Pterygium - A Study from Jammu and Kashmir

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Abstract

Background: Pterygium appears as a triangular fold of vascularized conjunctiva, the apex lies towards the cornea and base merges with the sub-conjunctival tissue. Generally, it is asymptomatic but may cause redness, lacrimation, photophobia, foreign body sensation (dry eye symptoms) and astigmatism.

Objective: To compare tear film break-up time test with Schirmer’s test with anaesthesia in patients having pterygium.

Materials & Methodology: The study was conducted at postgraduate upgraded department of Ophthalmology of GMC Jammu over period of one year. 90 patients having unilateral primary pterygium presenting to the eye OPD of GMC Jammu were included in the study. The eye with pterygium was taken as case and other eye taken as control for comparison. The TBUT, Schirmer’s test with anaesthesia/ SCH-2 were estimated in both eyes in all patients. A TBUT of less than 10 seconds, SCH-2 of less than 6mm, were considered abnormal.

Results: Among the pterygium eyes, decreased tear film breakup time of <10 seconds was observed in 43 (47.78%) eyes, while only 19(21.11%) of non- pterygium eyes had TBUT of <10seconds. On the other hand, 22 (24.44%) eyes with pterygium had Schirmer’s test with anaesthesia abnormal.

Conclusion: To detect tear film abnormality in patients with pterygium tear film break-up time has better diagnostic value as compared to schirmer’s test with anaesthesia.

Key words: Pterygium, Schirmer test, Tear film break up time, Tear secretion

INTRODUCTION

Pterygium is a common disorder in many parts of the world, with reported prevalence rates ranging from 0.3 to 29%. It is more common in dry, warm climate, and after exposure to ultraviolet radiations. Recent evaluation using spectral domain optical coherence tomography revealed pterygium as an elevated wedge-shaped mass of tissue separating the corneal epithelium from bowman’s membrane, which appears abnormally wavy and interrupted and often destroyed with satellite masses of subepithelial pterygium tissue beyond the clinically seen margin. 90% of the pterygia are located nasally but can occur temporally. It is often bilateral. Pterygium occurs twice as often in males as in females and is more common in farmers than in city dwellers. While the prevalence is highest in elderly, incidence is highest in the younger age group between 20 and 40 years. Patients with pterygium have decreased tear production, decreased tear film break-up time (TBUT), and Schirmer test value.
Tear instability is a disorder of tear film that is associated with pterygium. Tear film consists of 3 layers. The most superficial layer of the tear film is lipid layer which is 0.11 m thick and is produced by the meibomian glands. The middle layer is the aqueous layer produced by the main lacrimal gland as well as accessory lacrimal glands of Krause and Wolfring and is 7.0 m in thickness. Aqueous tear deficiency is the most common cause of dry eyes. Aqueous layer constitutes over 90% of the tear film. The layer closest to the cornea is the mucin layer 0.02-0.05 m thick, produced by conjunctival goblet cells. The tear film instability causes dry eye syndrome which can lead to vision-threatening complications, and therefore, early diagnosis is important. A close relationship between tear instability and ocular surface abnormality has been reported as Schirmer’s test and TBUT test were found to be lower in pterygium eyes.

Several clinical tests are available to measure various aspects of the integrity of the tear film and ocular surface such as Schirmer test, TBUT, and vital dye staining of the ocular surface. The objective of this study was to compare the TBUT test with Schirmer’s test with anesthesia as diagnostic utility to detect tear film abnormalities in patients with pterygium.

MATERIALS AND METHODS

This study was conducted on 90 patients having primary unilateral pterygium attending the Outpatient Department of Upgraded Department of Ophthalmology, Government Medical College, Jammu over a period of 1 year after due clearance from Institutional Ethics Committee. The informed consent from all the patients was undertaken before inclusion in the current study. All principals of bioethics were followed in totality as per ICMR and CDSCO advocated good clinical practice guidelines. The data were recorded by independent observer.

Inclusion Criteria

Patients were presenting with unilateral primary pterygium during the study period. The eye with pterygium was taken as case and other eye taken as control for comparison.

Exclusion Criteria

Subject with systemic diseases/syndromes associated with dry eye (e.g., Sjogren’s syndrome), subject on systemic medication (e.g. diuretics, psychotropics, that leads to ocular drying), contact lens users, subjects having other adnexal disease, anterior or posterior segment disease which alters tear secretion and stability, patients having recent ocular surgery (e.g., cataract surgery), patients on topical antiglaucoma medications that leads to ocular drying, recurrent pterygium, bilateral pterygium, those who did not gave consent.

After meeting the inclusion and exclusion criteria, pterygium patients were worked out in detail in the Department of Ophthalmology as under (1) detailed history pertaining to symptoms was recorded - onset, duration, any aggravating factor, (2) the patients were subjected to a routine general physical examination, and (3) every patient underwent a detailed ophthalmic examination as (a) external eye examination includes examination of eyelids, conjunctiva, cornea, iris, pupil, and lens; (b) visual acuity (both distance and near vision); (c) slit lamp examination: To visualize the anterior segment of the eye; (d) the following tests were performed as given below.

TBUT

Because manipulation of the eyelid or instillation of the anesthetics may affect the TBUT, the TBUT test was performed before other dry eye tests and recorded after fluorescein staining. Care was taken to avoid contact with the cornea to prevent an excessive reflex secretion of tear. The patient was examined on the slit lamp under red-free illumination provided by blue filter. The time interval between the opening of the eyelids and appearance of the first dry spots on the tear film was recorded using a stopwatch. Three recordings were taken and the average was recorded as the TBUT and considered positive if the average TBUT was <10 s.

Schirmer’s Test

Schirmer’s test with anesthesia (Basal secretion/SCH-2) was performed after the instillation of topical 4% xylocaine and wiping the lower fornix with cotton. The material used was commercially available Whatman no. 41 filter paper strips measuring 35 × 5 mm known as Schirmer’s tear test filter strips and is folded 5mm from one end. The patient was made to sit in a dimly lit room; the strip folded at the notch was placed gently over the lower palpebral conjunctiva at the junction of lateral 1.3 and medial 2.3. The patient was instructed to keep his eyes open and look straight ahead and blink normally. After 5 min, the strips were removed and the amount of wetting in millimeters was recorded. The Schirmer’s-2 test was considered abnormal if the length of the wetting was <6 mm at the end of 5 min.

Statistical Analysis

The data were analyzed using statistical software SPSS version 17.0. Proportions were used to represent qualitative data. Statistical significance between the groups was evaluated using Chi-square test. A $P < 0.05$ was considered as statistically significant and $P < 0.01$ was considered as highly significant.

RESULTS

This study was conducted on 90 patients with unilateral primary pterygium who attended eye OPD, GMC Hospital, Jammu, over a period of 1 year. During the study, following observations were made. The male to female ratio was 1.5:1.
Manhas, et al.: To Compare Tear Film Break-up Time with Schirmer’s Test with Anesthesia to Detect Tear Film Abnormality in Patients with Pterygium

**TBUT**

Among the pterygium eyes, decreased tear film break-up time (<10 s) was observed in 43 (47.78%) eyes, while only 19 (21.11%) of nonpterygium eyes have TBUT of <10 s (Table 1).

**Basal Secretion Values/Schirmer’s Test with Anesthesia/ SCH-2**

About 22 (24.44%) eyes with pterygium had Schirmer’s test with anesthesia abnormal (<6 mm) (Table 2).

The sensitivity of TBUT in pterygium eyes was 47.7% while specificity was 78.8% (Table 1).

The sensitivity of Schirmer’s test with anesthesia in pterygium eyes was 24.4% while specificity was 90% (Table 2).

| Table 1: Tear film break-up time in eyes with pterygium and without pterygium |
|---------------------------------|-------------------------------|-------------------|
| **TBUT (in seconds)**           | **Eyes with pterygium (%)**   | **Eyes without pterygium (%)** |
| <10                             | 43 (47.78)                    | 19 (21.11)         |
| ≥10                             | 47 (52.22)                    | 71 (78.89)         |
| Sensitivity of TBUT=47.7%, specificity of TBUT=78.8% |

| Table 2: Schirmer’s 2 test in eyes with pterygium and without pterygium |
|--------------------------------|-----------------|-----------------|
| **Schirmer’s-2 test (in mm)** | **Eyes with pterygium (%)** | **Eyes without pterygium (%)** |
| <6                              | 22 (24.44)       | 9 (10)          |
| ≥6                              | 68 (75.56)       | 81 (90)         |
| Sensitivity of Schirmer’s-2 test=24.4%, specificity of Schirmer’s-2 test=90% |

In Table 3, when we compared the TBUT with SCH-2 test in pterygium eyes the results were found significant \( P < 0.01 \).

In Table 4, when we compared the sensitivity of TBUT with SCH-2 test in pterygium eyes the results were found highly significant \( P < 0.0001 \).

**DISCUSSION**

Tear break-up time test is the standard clinical procedure that was introduced by Norn and its high sensitivity suggests a strong connection to the dry eye. \(^{14}\) It is an excellent diagnostic test for detecting the mucin and lipid layer deficiency of the tear film. \(^{15,16}\) Smith et al. in his study have shown that the most frequently used diagnostic test to determine tear film abnormality was the tear break-up time test which was done by 93% of the participants, followed by conjunctival and corneal staining done by 74-85%. Schirmer’s test was performed by 41% of the participants, which was more likely because of the irritative nature and time needed for this test. \(^{17}\) Korb has reported that the most common diagnostic test performed for tear film abnormality by 53% of the participants was the tear break-up time test, while the Schirmer’s test was done by 44%. \(^{18}\) As shown in a study, Schirmer’s test with anesthesia is the most popular test as it is easy to perform without any additional equipment and it indicates the instability of the aqueous phase of the tear film. \(^{19,20}\)

We correlated and found that the tear film abnormalities occur in patients with pterygium, and we performed clinical diagnostic TBUT and Schirmer’s tests with anesthesia. Schirmer’s test values with anesthesia are reduced in eyes with unilateral pterygium. According to Ishioka et al., tear film instability is reported in patients having pterygium, as values of both the tests were significantly reduced in these patients, and they found an association between pterygium and a shortened tear break-up time and Schirmer’s test in the case–control study. They concluded that there is a correlation between pterygium formation and unstable tear film. \(^{21}\) Lekhanont et al. found that the presence of pterygium was significantly associated with positive dry eye tests. \(^{22}\)

Our study found that in patients with pterygium eyes, TBUT test was abnormal in 47.78% of eyes and 21.11% of control eye. Ergin and Bozdogan had found that TBUT test was positive in 30.35% eyes with pterygium and 21.91% eyes in the control group. \(^{23}\) Similarly, Balogun et al. had also found unstable TBUT test in 39.7% eyes with pterygium and 23% eyes in the control group. \(^{8}\) Among our
patients with pterygium, the value of TBUT test was more compared to other studies which may be due to exposure to dust and hot climate leading to excessive evaporation of tears, as most of our patients were involved in outdoor work.\(^\text{10}\) Results similar to our study were found by Roka \textit{et al.} who in his study had reported positive TBUT test in 43.42% eyes with pterygium, and 19.07% eyes in the control group.\(^\text{24}\) Rahman \textit{et al.} reported TBUT test to be positive in 75.6% eyes with pterygium, and 9.3% eyes in the control group.\(^\text{10}\)

Among our patients, the Schirmer test with anesthesia was positive in 24.44% of eyes with pterygium and 10% of eyes in the control group. Ishioka \textit{et al.} found that the Schirmer's test with anesthesia was shortened in the eye with pterygium with significance.\(^\text{21}\) Balogun \textit{et al.} in his study has shown positive Schirmer's test in 31.2% eyes with pterygium and 30.82% in the control group.\(^\text{8}\) However, Rahman \textit{et al.} had reported that the Schirmer test was positive in 9.3% of eyes with pterygium and 3.5% of eyes in the control group,\(^\text{10}\) whereas Bandopadhayya \textit{et al.} had found no patient with pterygium and in the control group with abnormal value of Schirmer's test.\(^\text{13}\) Chaidaroon and Pongmoragot found Schirmer's test value with anesthesia was decreased significantly in eyes with pterygium when compared with a healthy eye.\(^\text{19}\) Roka \textit{et al.} had also found that the mean basal secretion was less in pterygium group as compared to control group, and there was statistically significant difference between the two groups ($P < 0.05$).\(^\text{24}\)

Our study showed that statistically, sensitivity of Schirmer's-2 test was found to be 24.4%, whereas specificity was 90.9%. The sensitivity of the TBUT test was 47.7% and specificity was 78.8% in eyes with pterygium, showing that it had good sensitivity compared to the Schirmer's test with anesthesia and was an important diagnostic tool for detecting tear deficiency in eyes with pterygium. Also in literature, reduced TBUT test in patients with pterygium has been reported, whereas no significant difference was seen with regard to the Schirmer's test.\(^\text{25}\) Both tests were performed by a single examiner. As such, observer bias was excluded from the study.

**CONCLUSION**

From this study, we can suggest that unstable tear film is found to a greater extent in eyes with pterygium than in another eye. The study demonstrated high sensitivity of the TBUT test compared to the Schirmer's test. This study has clearly demonstrated that Tear film break-up time test has better diagnostic value compared to Schirmer's test in detecting tear film abnormality in patients with pterygium. Tear film abnormality causes dry eye syndrome, which leads to vision-threatening complications. Thus, TBUT test could be used as an initial screening tool in outpatient departments to detect tear film instability in patients with pterygium.

**ACKNOWLEDGMENT**

Thanks from the core of my heart to GOD and my family for their blessings. Author special thanks Dr. Rashmi K Gupta for statistical analysis.

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Manhas, et al.: To Compare Tear Film Break-up Time with Schirmer’s Test with Anesthesia to Detect Tear Film Abnormality in Patients with Pterygium


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Dermatological Quality of Life and Psychiatric Morbidity Among 200 Vitiligo Patients

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Abstract

Introduction: Vitiligo is one of the most prevalent acquired depigmentation disorders that can produce significant psychosocial burden in patients who suffer from poor body image, low self-esteem, and considerable level of disability from the disease.

Purpose: The purpose of the study is to assess the quality of life (QoL) using the dermatological life quality index (DLQI), attitude to appearance (ATT), and impact of the disease questionnaire (IMPACT) score; to estimate the clinical interview schedule-revised (CIS-R); to evaluate the correlation of the disease.

Materials and Methods: The study was conducted in a total of 200 patients of vitiligo who attended the Dermatology out-patient department with the diagnosis of vitiligo made clinically. A detailed pro forma containing the sociodemographic details, clinical examination, clinical severity of the disease using vitiligo area, and severity index (VASI). Activity of the disease using vitiligo disease activity score was calculated. For assessment of perceptions, five screening instruments were used.

Results: Out of 200 cases, males comprised 113 (56.5%) with the majority married and from urban locality. Generalized type of vitiligo was the most common type (61%) with the mean ages of onset being 28.65 years. The mean VASI of the patients was 562.64. The mean DLQI score was found to be 4.82, and the mean ATT score was 2.82 and the mean IMPACT score was 3.4.

Conclusion: The effect on QoL and psychiatric morbidity was seen to be significant in women doing home management. Higher DLQI scores were observed in vitiligo patients with early age onset and clinical severity. The risk of psychiatric morbidity increased with higher DLQI and IMPACT scores.

Key words: Attitude to appearance, Clinical severity, Dermatological life quality index, Impact of the disease questionnaire scores, Psychiatric morbidity

INTRODUCTION

Vitiligo with a prevalence of about 0.38-3.2% is the most prevalent acquired depigmentation disorder reported from the world literature.¹ ² ³ The prevalence in India was reported as 1.79%.⁴ Although it does not cause direct physical impairment, it can produce significant psychosocial burden with patients suffering from poor body image, low self-esteem and experiencing considerable level of disability from skin disease.⁵ Quality is a broad concept that encompasses physical health, psychological status and level of independence, social relations, beliefs and relationship to the environment.⁶ The dermatological life quality index (DLQI) was chosen as the instrument to measure the QOL in view of its ease of application to a variety of skin diseases, its ease of use in busy out patients setting, and because it has been widely validated.⁷ It is a simple practical questionnaire technique for routine clinical use. Finlay et al.⁸ found the overall mean DLQI score for dermatology patients was 7.3 in their study, while Kent and Al-Abadie⁹ assessed DLQI in vitiligo patients which averaged 4.82. Studies have indicated that people who suffer from dermatological conditions experience higher level of distress, as measured by instruments such as the general health questionnaire (GHQ) and by structured diagnostic interviews, than the general population.¹⁰ ¹¹ Picardi et al.¹²

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estimated it to be 30.6% in females compared to 17.6% in males using GHQ-12, in dermatological outpatients and the overall prevalence was 25.2%. Psychiatric morbidity has not been studied to a great extent in the Indian population among patients with vitiligo. Among the few studies from India, a study worth mentioning was done by Mattoo et al.13 who reported the prevalence of psychiatric morbidity to be 24.7%. Weiss et al.10 however reported the prevalence of depressive disorder to be 47% in patients with vitiligo.

**Purpose**

The purpose of the study is to assess the QoL among patients with vitiligo using the DLQI, Attitude to appearance (ATT) and impact of the disease questionnaire (IMPACT) scores; to estimate the prevalence of psychiatric morbidity among patients with vitiligo using the clinical interview schedule-revised (CIS-R); to assess the patients perception of disease using the Modified short explanatory model interview (SEMI) questionnaire; to evaluate the correlation of perception of illness, sociodemographic and clinical characteristics versus QoL and psychiatric morbidity in patients with vitiligo.

**MATERIALS AND METHODS**

This was a cross-sectional study conducted in the outpatient clinic of the Department of Dermatology, Madras Medical College, Chennai, a tertiary care hospital in Tamil Nadu. A total of 200 patients with a clinical diagnosis of vitiligo who attended the Dermatology OPD who were eligible under the inclusion criteria of willingness to participate in the study and who were >14 years were considered. The exclusion criteria were patients not willing to participate in the study and those who were <14 years of age. The diagnosis of vitiligo was made clinically. A detailed pro forma containing sociodemographic details was completed which includes age, gender, social and work status, and disease-related characteristics. Clinical examination included type of vitiligo, site and distribution. The vitiligo was classified as generalized, acrofacial, segmental, and localized vitiligo. The clinical severity of the disease was calculated using the vitiligo area and severity index (VASI) as detailed by Hamzavi.14 The activity of the disease was also measured using vitiligo disease activity score (VIDA). In VIDA, the disease activity is scored by history taking on a 6-point scale. It is a simple scoring system for classifying ongoing disease activity in relation to time, as assessed by the patient.15 For assessment of perceptions of illness, their ATT, impact on certain areas of lives, QoL and psychiatric morbidity, of each patients was done by five screening instruments such as modified SEMI, the ATT questionnaire, IMPACT, the DLQI, and the score (CIS-R). From the above measurements, continuous variables such as mean, standard deviation, and range and di/ polychotomous variables like frequency distributions were calculated. The Chi-squared and Fisher’s tests were used to assess the significance of associations for categorical data, and Student’s t-test was used to test the associations for continuous variables. Pearson’s correlation coefficient was employed to study the correlation between variables. The statistical software SPSS for Windows release was employed for the analysis of data.

**RESULTS**

Out of 200 cases, males comprised 113 (56.5%) of the patients. The majority of the patients, 163 (81.50%), were from urban, and 147 (73.50%) of the patients were married. Based on education, 24 (11%) patients were illiterate, 43 (21.5%) patients were educated up till primary school and those with education above primary school were 157 (78.5%). Based on the occupation housewives consisted 64 (32%). Those employed were 94 (47%) and the unemployed 106 (53%). Based on the clinical characteristics, Generalized type of vitiligo was the most common type (61%). Stable type of vitiligo was seen in 55%. The majority of the patients (86%) had involvement of the uncovered areas (Table 1). The mean age at presentation was 36.40 years, and the mean age of the onset was 28.65 years. The mean duration of the illness was 85.17 months, and the duration of exacerbation was 29.87 months. The mean duration between appearance of symptoms and the treatment sought was 18.68 months. Family history of vitiligo was present in 15.50% of patients. Clinical severity calculated using vitiligo area severity index (VASI) showed a mean of 562.64 and ranged from 23 to 8024, the median was 268. Patients who had received treatment before presentation were 162 (81%). Patients perception of their illness showed out of the 179 (89.5%) who came to the hospital for treatment, 42.5% named the disease by its medical or vernacular term. An open-ended questioning on the cause of onset of the disease showed 67 (33.5%) patients believed that their illness had

<table>
<thead>
<tr>
<th>Table 1: Clinical characteristics of vitiligo</th>
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<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>Type of vitiligo</td>
</tr>
<tr>
<td>Generalized</td>
</tr>
<tr>
<td>Acro-facial</td>
</tr>
<tr>
<td>Segmental</td>
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<tr>
<td>Localized</td>
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<tr>
<td>Stability</td>
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<tr>
<td>Stable</td>
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<tr>
<td>Unstable</td>
</tr>
<tr>
<td>Region involved</td>
</tr>
<tr>
<td>Covered</td>
</tr>
<tr>
<td>Uncovered</td>
</tr>
</tbody>
</table>

Type/stability/region involved
Daniel and Sivanesan: DLQI and Psychiatric Morbidity in 200 Vitiligo Patients

a medical cause and 7% believed that it was due to a drug reaction. 19 patients (9.5%) reported that vitiligo affected their marriage prospects and 2 patients (1%) affecting their married life.

Based on the quality of life, the mean ATT score was 2.82% and the median was 3 with IQR = 1. The mean IMPACT score was 3.4 and the median was 4 with interquartile range (IQR) = 3. The DLQI scores ranged from 0 to 20 with a mean of 4.82 and the median with IQR = 7. Sociodemographic characteristic revealed that females had a higher DLQI score compared to males (P < 0.001). The unemployed had a median DLQI score of 5 compared to employed population who had median DLQI score of 3 (P < 0.001). Patients with a higher DLQI score also had a higher VASI. The median VASI in patients with DLQI score >5 was 358 (IQR = 471.5) compared to median VASI of 210.5 (IQR = 348) in patients with DLQI score of <5 (P = 0.002). The patients with vitiligo over the covered areas had a median DLQI score of 3 (IQR = 5) compared with the median of 4 (IQR = 7) in patients who had vitiligo over uncovered areas (P = 0.07). The DLQI score in patients with generalized and acrofacial type of vitiligo (median = 5) was higher than those with localized type (median = 2) (P = 0.001) (Table 2). For analysis purpose, the segmental type of vitiligo was merged with localized type. The patients with stable vitiligo had a median DLQI score of 3 (IQR = 6) compared with unstable vitiligo who had a median DLQI score of 4.5 (IQR = 6.5) (P = 0.32). Age of onset had a significant negative correlation (P = 0.03) with DLQI score. However, duration of disease (P = 0.62) and exacerbation (P = 0.41) were unrelated to DLQI scores.

The patients who named the illness as vitiligo showed a higher DLQI score (P = 0.004). The patients who felt that their illness was affecting their personal or relatives marriage had a significant higher impairment of DLQI, compared to those who did not (P < 0.001).

The CIS-R score varied from 0 to 20 with mean score 5.8, and the patients with psychiatric morbidity were 29 (14.5%). The proportion of females with psychiatric morbidity (19.74%) was higher than males (10.58%) (P = 0.02). The proportion of employed patients with psychiatric morbidity were 10.60% compared to 18.16% of the unemployed (P = 0.05). Patients with psychiatric morbidity tended to have a higher median VASI (480) compared to those without (216), and the difference was statistically significant (P < 0.001). There was no correlation between the psychiatric morbidity and the duration of the disease. The median duration of disease in patients with psychiatric morbidity was 70 months (IQR = 152) compared to the median of 44 months (IQR = 90) in patients who did not have psychiatric morbidity (P = 0.30). There was no significant difference in the age of onset of the disease between the patients with psychiatric morbidity and those without. The type of vitiligo did not have any correlation with psychiatric morbidity. It was more prevalent among those with vitiligo involving the exposed areas of the body 9 (P = 0.01). There was no significant correlation between the psychiatric morbidity and the activity of the disease (Table 3). The psychiatric morbidity did not significantly differ in patients who reported that their disease had affected their own (P = 0.14) or their relatives marriage from those who did not (P = 0.07). There was a significant correlation of psychiatric morbidity with the ATT and IMPACT score. The patients with psychiatric morbidity also had a higher mean ATT (P = 0.002) and IMPACT score (P = 0.0003) compared to those who did not have psychiatric morbidity suggesting a perfectionist attitude and a greater impact of the disease on the QoL. There was a significant correlation between DLQI and psychiatric morbidity. The median DLQI for patients with psychiatric

| Table 2: Type of vitiligo and DLQI |  |  |  |  |
|---|---|---|---|
| Type of vitiligo | DLQI score | Chi-square | P-value |
| | No | Median | IQR |
| Generalized | 122 | 5 | 7 |
| Acrofacial | 36 | 5 | 8 |
| Localized | 40 | 2 | 4 |

DLQI: Dermatological life quality index, IQR: Interquartile range

<table>
<thead>
<tr>
<th>Table 3: Clinical characteristics and psychiatric morbidity</th>
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<tr>
<td>Clinical characteristics</td>
<td>Psychiatric morbidity</td>
<td>Total</td>
<td>Chi-square</td>
<td>P-value</td>
</tr>
<tr>
<td></td>
<td>Cases (%)</td>
<td>Noncases (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of vitiligo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalized</td>
<td>20 (16.39)</td>
<td>102 (83.61)</td>
<td>122</td>
<td>2.36</td>
</tr>
<tr>
<td>Acrofacial</td>
<td>5 (13.88)</td>
<td>31 (86.12)</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Localized</td>
<td>4 (9.52)</td>
<td>36 (90.48)</td>
<td>42</td>
<td></td>
</tr>
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<td>Region involved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Covered</td>
<td>2 (7.14)</td>
<td>26 (92.86)</td>
<td>28</td>
<td>6.5716</td>
</tr>
<tr>
<td>Exposed</td>
<td>32 (18.60)</td>
<td>140 (81.40)</td>
<td>172</td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable</td>
<td>15 (13.63)</td>
<td>95 (86.37)</td>
<td>110</td>
<td>0.1186</td>
</tr>
<tr>
<td>Unstable</td>
<td>14 (15.55)</td>
<td>76 (84.45 )</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>
morbidity was 9.3 as compared to median of 3 in those who did not have psychiatric morbidity ($P < 0.001$).

The ATT scores did not correlate with VASI. The median VASI in patients with ATT scores $< 3$ was 260 (IQR = 380) compared to median VASI of 220 (IQR = 355) in patients with ATT score $>3$ ($P = 0.12$). There was no association of ATT with gender and area of distribution of the skin lesions (Table 4). The ATT scores did not correlate with the type of vitiligo. The patients who felt that their illness were affecting their personal or relative's marriage prospects did not have a significantly higher score of ATT compared to those who did not.

The patients with IMPACT score $<4$ had a mean age of onset of 31.6 years compared with mean of 26.8 years in patients with IMPACT score $>4$ ($P = 0.01$). The females had a higher IMPACT score compared to males ($P < 0.001$). The IMPACT score did not vary with the type of vitiligo, but patients with involvement of uncovered areas had a higher IMPACT score ($P = 0.001$) (Table 5). The patients with higher IMPACT score also had a higher VASI ($P = 0.0004$). The patients who felt that their illness was affecting their illness was affecting their personal ($P = 0.0001$) or relatives marriage prospects ($P = 0.004$) had a significant higher impairment of their QoL compared to those who did not. A significant correlation was found between DLQI and IMPACT after adjusting for ATT (Table 6).

On univariate analysis, the risk factors for psychiatric morbidity were female sex, housewives, ATT score $>3$, IMPACT score $>4$, DLQI score $>5$ (Table 7). On multivariate analysis after adjusting for gender, occupation and patients perception of the disease, the major risk factors were IMPACT score $>4$ and DLQI score $>5$. The psychiatric morbidity was found to be 2.26 times higher if the IMPACT was $>4$, 3.72 times higher if DLQI score was $>5$ (Table 8).

### DISCUSSION

Vitiligo is the most common depigmenting disorder that is associated with significant degrees of psychiatric morbidity and also a significant effect on quality of life. This study provides further insight regarding the quality of life and psychiatric morbidity in vitiligo. Vitiligo affects individuals of all age group, under 10 years to above 70 years. In our study, the mean age of onset of vitiligo was 28.65 years and ranged from 14 to 72 years. This was less when compared to that observed by Howitz et al. from Denmark. The mean age of presentation was 36.40 years, similar to studies reported from North India. and less compared to a study done by Ongenae et al. from Belgium. There was a preponderance of males in our study (M:F = 1.3:1) similar to a study where the ratio was (1.2:1) but in

### Table 4: Type of vitiligo and ATT score

<table>
<thead>
<tr>
<th>Type of vitiligo</th>
<th>ATT score</th>
<th>Total</th>
<th>Chi-square</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$&lt;3$ (%)</td>
<td>$&gt;3$ (%)</td>
<td></td>
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<tr>
<td>Generalized</td>
<td>101 (82.78)</td>
<td>21 (17.22)</td>
<td>122</td>
<td>0.36</td>
</tr>
<tr>
<td>Acrofacial</td>
<td>29 (80.55)</td>
<td>7 (19.45)</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Localized</td>
<td>33 (78.57)</td>
<td>9 (21.43)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>163 (81.50)</td>
<td>37 (18.50)</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

ATT: Attitude to appearance

### Table 5: Type and distribution of vitiligo and IMPACT score

<table>
<thead>
<tr>
<th>Variables</th>
<th>IMPACT score</th>
<th>Total</th>
<th>Chi-square</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$&lt;4$ (%)</td>
<td>$&gt;4$ (%)</td>
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<td></td>
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<tr>
<td>Type of vitiligo</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalized</td>
<td>75 (61.47)</td>
<td>47 (38.53)</td>
<td>122</td>
<td>3.14</td>
</tr>
<tr>
<td>Acrofacial</td>
<td>21 (58.33)</td>
<td>15 (41.67)</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Localized</td>
<td>30 (71.42)</td>
<td>12 (28.58)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Covered</td>
<td>22 (78.57)</td>
<td>6 (21.43)</td>
<td>28</td>
<td>12.02</td>
</tr>
<tr>
<td>Uncovered</td>
<td>97 (56.39)</td>
<td>75 (43.61)</td>
<td>172</td>
<td></td>
</tr>
</tbody>
</table>

IMPACT: Impact of the disease

### Table 6: Correlation between DLQI, ATT, and IMPACT score

<table>
<thead>
<tr>
<th>Variables (scores)</th>
<th>Correlation coefficient</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLQI versus ATT</td>
<td>0.08</td>
<td>0.13</td>
</tr>
<tr>
<td>DLQI versus IMPACT</td>
<td>0.48</td>
<td>$&lt;0.001$</td>
</tr>
</tbody>
</table>

DLQI: Dermatological life quality index, ATT: Attitude to appearance, IMPACT: Impact of the disease

### Table 7: Univariate analysis in relation to psychiatric morbidity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Males</td>
<td>0.46</td>
<td>0.22-0.88</td>
<td>0.026</td>
</tr>
<tr>
<td>Occupations: Housewives</td>
<td>2.48</td>
<td>1.23-4.72</td>
<td>0.005</td>
</tr>
<tr>
<td>Attitude to appearance: $&gt;3$</td>
<td>1.34</td>
<td>0.60-2.95</td>
<td>0.413</td>
</tr>
<tr>
<td>Impact score: $&gt;4$</td>
<td>3.59</td>
<td>1.79-7.08</td>
<td>$&lt;0.001$</td>
</tr>
<tr>
<td>DLQI score: $&gt;5$</td>
<td>4.20</td>
<td>2.10-8.36</td>
<td>$&lt;0.001$</td>
</tr>
</tbody>
</table>

CI: Confidence interval, DLQI: Dermatological life quality index, IMPACT: Impact of the disease

### Table 8: Multivariate analysis in relation to psychiatric morbidity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Odds Ratio</th>
<th>95% confidence interval</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Males</td>
<td>1.80</td>
<td>0.53-5.68</td>
<td>0.268</td>
</tr>
<tr>
<td>Occupations: Housewives</td>
<td>2.12</td>
<td>0.68-6.24</td>
<td>0.152</td>
</tr>
<tr>
<td>Attitude to appearance: $&gt;3$</td>
<td>1.2</td>
<td>0.48-2.75</td>
<td>0.648</td>
</tr>
<tr>
<td>Impact score: $&gt;4$</td>
<td>2.26</td>
<td>1.09-5.26</td>
<td>0.045</td>
</tr>
<tr>
<td>DLQI score: $&gt;5$</td>
<td>3.72</td>
<td>1.68-8.92</td>
<td>0.001</td>
</tr>
</tbody>
</table>

DLQI: Dermatological life quality index, IMPACT: Impact of the disease
contrast to the studies done elsewhere showing female predominance.23,31,38 This difference may be due to health seeking behavior among men and negligence of medical health among women. The mean duration of disease in our study was 85.17 months similar to Mattoo et al.13 study where it was 80.40 months but lesser when compared to findings of a study from Belgium by Ongenae et al.17 where the mean disease duration was 120 months. The large majority of our patients 163 (81.50%) were from urban areas as reported in other studies.23 The study by Mattoo et al.13 from Chandigarh, India, reported only 56.63% from the urban locality. Only 24 (12%) of the patients were illiterate. The patients who had received education above the primary level were 157 (78.5%). Hence, the majority of the patients in our study were literate from urban areas thereby having a bearing on the indices measured. The housewives constituted 32% of the study population. There were 94 (47%) employed patients and 106 (53%) of the patients were currently unemployed.

There were 122 (61%) patients with generalized vitiligo, 36 (18%) had acro-facial vitiligo, there were only 2 (1%) patients with segmental vitiligo, and 40 (20%) had localized vitiligo. This was in contrast to a study from Tunisia, where generalized vitiligo was present in 37.5%, acrofacial in 12.5%, and localized type in 25% of the study population.19 A study from South India reported that generalized vitiligo was present in 48%, acrofacial type in 22.7%, and localized type in 16% and segmental type in 13.3%.20 31 (15.5%) of the patients had family history of vitiligo. This was in contrast to the findings of the study done by Gopal et al.20 where prevalence was found to be 36%, 172 (86%) patients had vitiligo involving the covered areas in the body. This was almost similar to Akrem et al.21 study from Tunisia, where vitiligo involved the uncovered areas in 78.33% of the population. Borimnejad et al.22 from Iran reported location of vitiligo lesions over the visible areas in 53(76.4%) patients. This could be explained by the stigma attached with vitiligo which forces a patient to seek treatment if the visible areas are affected reflecting on the impact of location of the disease over QoL. Vitiligo area severity index (VASI) to assess the severity of vitiligo showed a mean of 562.64 and ranged from 23 to 8024.

The mean DLQI score in our study was 4.82 and ranged from 0 to 20, similar to the study by Kent and Al-Abadie6 where the DLQI scores ranged from 0 through 26 with mean of 4.82. Ongenae et al.17 also reported a mean DLQI score of 4.95 which is similar to our study. However, this is contrast to the mean DLQI scores in Prasad et al.16 study which ranged from 2 to 21 with a mean score of 10.67. In our study, females had a higher impairment of QoL compared to males, as also housewives when compared to rest of the population. Ongenae et al.17 and Borimnejad et al.18 also reported a higher overall score of DLQI among women thereby identifying gender as the most important predictor of DLQI score. This was in contrast to Kent and Al-Abadie6 and Prasad et al.16 where they found little relationship between DLQI scores and gender. In our study, there was a significant relationship between the DLQI scores and mean age of onset, similar to study reported by Prasad et al.16 but unlike Kent and Al-Abadie6 who found little difference between the two. Impairment of QoL was also found to be significantly higher in the unemployed compared to those who were employed. There was no significant correlation between QoL impairment, education, locality, residence, and marital status in our study. Those patients with a higher mean VASI also had a significant QoL impairment which was in contrast to another study, where there was no correlation between the DLQI and the extent of the disease.16 Ongenae et al.17 found that vitiligo confined to the head, face, neck, trunk and localized to the feet correlated significantly with the overall DLQI score. This finding was similar to our results. In our study, QoL did not correlate with the stability of vitiligo, and there were no other study reports that compared the disease activity to the QoL available. QoL was affected in those patients who reported that vitiligo affected their personal or relatives marriage prospects, but there are no other studies assessing this variable.

About 29 patients (14.50%) had psychiatric morbidity as assessed by CIS-R. The psychiatric morbidity was found to be 39% in a study done on chronic disfiguring dermatological conditions.23 The psychiatric morbidity as assessed by GHQ-12 scale done by Samponga et al.22 from Italy showed a score of 47.5 in GHQ cases compared to score of 32.5 in GHQ noncases. There is a paucity of studies assessing psychiatric morbidity in patients with vitiligo in literature. Females (19.74%) were more affected than males (10.58%) which were statistically significant. However, Matoo et al.13 in their study did not find any correlation between gender and psychiatric morbidity and reported that among GHQ positive cases, 57.14% were females and 42.85% were males. They also reported 57.14% GHQ-positive cases were not married compared to 42.85% married patients. In our study, the patients with psychiatric morbidity, 22.46% were housewives but it did not differ among patients based on marital status, level of education, and locality. Vitiligo affected the marital life of only 3 (1.5%) patients. There was no difference in the psychiatric morbidity of the patients who reported that vitiligo affected their personal or relatives marriage prospects and those who did not. The patients with psychiatric morbidity had more severe disease with a higher mean VASI score. In Samponga et al.22 study from Italy, the authors found that the association between the psychiatric morbidity and QoL.
did not depend on the severity of the skin condition. In Mattoo et al.’s study from Chandigarh, they did not find a significant difference mean percent area of vitiligo among GHQ-positive and negative cases. In our study, psychiatric morbidity did not differ with the mean age of onset of the disease or the mean duration of the disease that was similar to the findings of Mattoo et al. Psychiatric morbidity was also unrelated to the type of vitiligo of the stability of the disease but was more in those patients with disease on the uncovered areas of the body.

The mean ATT score in patients with psychiatric morbidity was 3.12 compared to mean ATT score of 2.82 in those patients who did not have psychiatric morbidity which was significant. In Mattoo et al.’s study from North India, the mean ATT score in vitiligo patients who were GHQ-positive cases was 4.23 while in the GHQ negative cases was 4.06 which was not statistically significant.

The IMPACT score is a composite measure reflecting both the psychiatric disorder and the behavioural change resulting from vitiligo. The mean IMPACT score was 3.5. The mean IMPACT score in patients with psychiatric morbidity was 4.5 compared to 3.2 in those who did not have psychiatric morbidity. In Mattoo et al.’s study, the mean IMPACT score in GHQ-positive cases was 4.00, and the mean IMPACT score in GHQ negative cases was 1.98. 56 patients (74.25%) had an IMPACT score >4 compared to only 18 (23.78%) male patients similar to Wessely and Lewis study. IMPACT score was higher in those patients who had vitiligo lesions over the uncovered areas of the body consistent with findings of Wessely and Lewis.

There was a significant correlation between DLQI and psychiatric morbidity. The median DLQI for patients with psychiatric morbidity was 9.3 as compared to median of 3 in those who did not have psychiatric morbidity suggesting that the patients with psychiatric morbidity had a significantly impaired QoL. There was a significant correlation of psychiatric morbidity with ATT and IMPACT scores. These scores were significantly higher in the patients with psychiatric morbidity, suggesting that the disease had a greater impact on the daily activities of these patients. There was a significant correlation between the DLQI and IMPACT scores after adjusting for the ATT score indicating that vitiligo had a major impact on the lifestyle of the patients since its onset and this did not depend on whether the patient had a perfectionist attitude or not. The higher ATT and IMPACT scores in patients with psychiatric morbidity suggest a significant change in vitiligo related social and psychosocial dysfunction.

CONCLUSION

Out of the 200 patients with vitiligo studied, the mean DLQI score was found to be 4.82 and scores ranged from 0 to 20. 29 (14.5%) patients had psychiatric morbidity. The mean ATT score was 2.82 and the mean IMPACT score was 3.4. The effect of QoL and psychiatric morbidity was significant to QoL. There was also a significant correlation of psychiatric morbidity with QoL. The clinical features which showed correlation with QoL were clinical severity and the type of vitiligo. Psychiatric morbidity depended on the clinical severity and location of vitiligo lesions on the exposed areas. The patients who presented primarily for the treatment of vitiligo had significant impaired QoL. Effect on marriage of patient’s or relatives was also associated with higher impairment of QoL. Further longitudinal trials should be undertaken to assess the risk factors associated with the psychiatric morbidity in vitiligo. It is important to recognize the psychological component of this distressing condition by adequate evaluation of the mental state of the patient. Counseling and referral to a Psychiatrist would help to improve the appearance-related stress handling capability and to improve the general well-being of the patient.

REFERENCES


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Clinical Profile of Third, Fourth, and Sixth Cranial Nerve Palsies Presenting to a Tertiary Care Ophthalmic Center

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Abstract

Introduction: Ocular motor nerve palsies differ in distribution and etiology in different studies depending on clinical settings and geographic distribution.

Materials and Methods: A cross-sectional study of patients presenting or referred as ocular nerve palsies to our center was done. History including age, sex, history of trauma, and vascular risk factors was noted. Detailed clinical evaluation including ophthalmological and neurological examination to diagnose the type of palsy was done. Neurology consultation and appropriate imaging studies were conducted in all cases to reach an etiological diagnosis.

Results: Of a total of 30 patients, 18 (60%) were male, and 12 (40%) were female. Age ranged from 8 to 68 years with a mean of 41.17±14.38 years. Majority of patients were in the 30-60 years age group (70%). 93.3% were unilateral while 6.7% was bilateral. The most common presenting complaint was diplopia in 70% patients, followed by drooping of lids in 26.67%. Other complaints were defective vision, deviation of eyes (13.4% each), and pain and proptosis (3.33%). The most common ocular motor nerves involved were abducens nerve (46.7%) followed by oculomotor nerve (23.3%), combined nerve involvement (20%), and finally by trochlear nerve (10%). The most common cause was trauma (36.7%), followed by vascular causes (26.7%). Other causes included inflammation (10%), demyelination, meningitis and tumors (6.7% each), aneurysm and congenital causes (3.3%). Most common cause for 6th nerve palsy was vascular cause while it was a trauma for 3rd nerve palsy.

Conclusion: Based on good history taking and clinical examination a provisional diagnosis can be arrived at to decide on individualized investigations. This will help to make an accurate etiological diagnosis and management.

Key words: Etiology, Fourth, Sixth cranial nerve palsy, Third, Trauma, Vascular causes

INTRODUCTION

Extraocular muscles are innervated by the 3rd, 4th, and 6th cranial nerves which control ocular movements. These often present as diplopia, drooping of lids, deviation of eyes, and defective vision. As these often present initially to the ophthalmologist, a knowledge of the etiology and presentation of various ocular palsies is important to decide on further investigations to reach a diagnosis and manage the condition. Multiple causes such as trauma, vascular disease, intracranial tumors, or aneurysm can result in palsy of these nerves. Various studies have shown differing etiology and affected nerve distribution. These may differ with the clinical settings and geographic distribution.

In this study, we aim to study the patterns of ocular nerve palsy and their etiology presenting to a tertiary ophthalmic care center.

MATERIALS AND METHODS

This was done as a cross-sectional study of patients presenting or referred to our outpatient department or
neuro-ophthalmology clinic with features suggestive of ocular nerve palsies such as diplopia, drooping of lids, or sudden onset deviation of eyes. Institutional Ethics Committee approval was obtained for this study. Patients underwent a detailed history taking including age of onset, sex, history of head trauma, and previous medical history, especially the presence of vascular risk factors (diabetes, hypertension, ischemic heart disease, dyslipidemia, and vascular disease). Clinical examination included visual acuity, slit lamp examination, pupillary reflexes, fundus examination, ocular motility examination, and intraocular pressure recording. Other tests included cover test, prism bar cover test, diplopia charting, Park Belshowsky three-step test, and forced duction test, and active force generation test when needed. Based on the findings, patients were diagnosed as 3rd, 4th, or 6th nerve palsy. Those with supranuclear causes of motility disorders, myogenic causes and restrictive causes were excluded from the study. Blood pressure was recorded in all cases. Routine investigations of blood, urine, glycosylated hemoglobin, fasting blood sugar, postprandial blood sugar, and lipid profile were done. Neurology consultation and appropriate imaging studies were conducted in all cases. Lumbar puncture and cerebrospinal fluid study were conducted in indicated cases in the neurology department. Cases were managed appropriately with those requiring surgical interventions being referred to the department of neurosurgery.

RESULTS

A total of 30 patients presented to our center during the study period. Of these, 18 (60%) were male, and 12 (40%) were female. Age ranged from 8 to 68 years with a mean of 41.17±14.38 years. Majority of patients were in the 30-60 years age group (70%) (Figure 1). 93.3% were unilateral while 6.7% were bilateral. The most common presenting complaint was diplopia in 70% patients, followed by drooping of lids in 26.67%. Other complaints were defective vision, deviation of eyes (13.4% each), and pain and proptosis (3.33%).

The most common ocular motor nerves involved were abducens nerve (46.7%) followed by oculomotor nerve (23.3%), combined nerve involvement (20%), and finally by trochlear nerve (10%) (Figure 2). The most common cause was trauma (36.7%), followed by vascular causes (26.7%). Other causes included inflammation (10%), demyelination, meningitis and tumors (6.7% each), aneurysm, and congenital causes (3.3%).

Demographic features of each nerve palsy are summarized in Table 1. Majority of 6th nerve palsy was vascular (50%) followed by traumatic (28.6%) and demyelination (14.3%), and meningitis (7.1%) where there was bilateral involvement. All patients with vascular 6th nerve involvement had a history of both diabetes and hypertension except two with only diabetes of which one had dyslipidemia along with diabetes. All patients except one had uncontrolled diabetes with elevated blood sugar and HbA1C of more than 9. Of the 4 cases due to trauma, computed tomography (CT) brain showed evidence of head injury in 50% cases, one contusion, another subdural hematoma, while the rest was normal.

### Table 1: Demographic distribution of the ocular nerve palsies

<table>
<thead>
<tr>
<th>Cranial nerve</th>
<th>Mean age in years (range)</th>
<th>Sex ratio M: F</th>
<th>U/L:B/L</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>44.14 (17-62)</td>
<td>3:4</td>
<td>7:0</td>
<td>7 (23.3)</td>
</tr>
<tr>
<td>IV</td>
<td>22.3 (8-37)</td>
<td>3:0</td>
<td>3:0</td>
<td>3 (10.0)</td>
</tr>
<tr>
<td>VI</td>
<td>45.57 (23-68)</td>
<td>7:7</td>
<td>13:1</td>
<td>14 (46.7)</td>
</tr>
<tr>
<td>Combined</td>
<td>40.1 (24-56)</td>
<td>5:1</td>
<td>6:0</td>
<td>6 (20)</td>
</tr>
<tr>
<td>Total</td>
<td>41.17 (+/-14.38)</td>
<td>18:12</td>
<td>29:1</td>
<td>30 (100)</td>
</tr>
</tbody>
</table>

![Figure 1: Age distribution of ocular nerve palsies](image1)

![Figure 2: Distribution of various ocular nerve palsies](image2)
Most common cause of 3rd nerve palsy was trauma (57.14%). Other causes were vascular causes, aneurysm (Figure 3) and invasive pituitary adenoma (14.2% each). Of the trauma cases, CT brain was normal in 2 patients, while the other two had evidence of head injury with a subdural hematoma and subarachnoid hematoma. Both the latter were hypertensive. The patient with vascular ischemic 3rd nerve palsy was having uncontrolled diabetes and hypertension with a history of ischemic heart disease. Pupil was spared in 28.6% while 71.4% had pupil involvement. Pupil was not involved in the vascular case and 1 case of trauma in which only superior division was affected. All other compressive lesions had pupillary involvement.

Of isolated 4th nerve palsy, one was congenital while other two were traumatic, one due to orbital trauma and fractures and another due to head injury with an extradural hematoma. This was found to occur in a younger age group than the other nerves as shown in Table 1.

Combined nerve palsies were most commonly seen in inflammatory causes - Tolosa-Hunt syndrome (50%) with the involvement of 3rd and 4th in 2 cases and 3,4,6 in one. Other causes were nasopharyngeal carcinoma (bilateral 3,4,6 along with optic nerve involvement and proptosis), trauma with (4,6 nerves), and meningitis (3,4,6 nerves). The aetiological distribution of ocular nerve palsies is summarized in Table 2 while their demographic features are summarized in Table 3.

Traumatic nerve palsies more commonly involved 3rd and 6th nerves (36.4% each) (Figure 4) followed by 4th nerve (18.2%) followed by combined nerve palsies (9%). Mean age of these patients was 36.73 years (22-54 years). Males were more commonly affected (63.6% vs. 36.4%).

Vascular ocularpalsy commonly involved the 6th nerve (87.5%) followed by 3rd nerve (12.5%). 4th nerve was not affected. Mean age group was 55.75 years (47-68 years). Patients with vascular causes were older than those with traumatic cause. Females showed slightly more preponderance (62.5% vs. 37.5%). All patients with vascular nerve palsy were diabetic, 75% had both diabetes and hypertension, 12.5% (Figure 5) had dyslipidemia with diabetes, and 12.5 had ischemic heart disease with diabetes and hypertension. Hence, 87.5% had 2 or more vascular risk factors. Vascular risk factors were also present in 22.7% of cranial nerve palsies due to other causes but only either diabetes or hypertension, though both were present in a patient with aneurysm. All these patients except one had traumatic 3rd nerve palsy with subarachnoid and dural bleed seen in patients with hypertension.

Demyelination involved only the 6th nerve in our study. Inflammatory cause - Tolosa-Hunt syndrome accounted for the combined nerve palsies with the involvement of 3rd and 4th in 2 cases and 3,4,6 in one. Meningitis was

<table>
<thead>
<tr>
<th>Causes</th>
<th>III</th>
<th>IV</th>
<th>VI</th>
<th>Combined</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>11 (36.7)</td>
</tr>
<tr>
<td>Vascular</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>8 (26.7)</td>
</tr>
<tr>
<td>Tumors &amp; Aneurysms</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3 (10)</td>
</tr>
<tr>
<td>Demyelination</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Meningitis</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3 (10)</td>
</tr>
<tr>
<td>Congenital</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1 (3.3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Causes</th>
<th>Mean age years</th>
<th>Range years</th>
<th>Sex ratio M:F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trauma</td>
<td>36.73</td>
<td>22-54</td>
<td>7:4</td>
<td>11</td>
</tr>
<tr>
<td>Vascular</td>
<td>55.075</td>
<td>47-68</td>
<td>3:5</td>
<td>8</td>
</tr>
<tr>
<td>Tumors &amp; Aneurysms</td>
<td>28.5</td>
<td>17-40</td>
<td>1:1</td>
<td>3</td>
</tr>
<tr>
<td>Demyelination</td>
<td>40</td>
<td>30-50</td>
<td>1:1</td>
<td>2</td>
</tr>
<tr>
<td>Meningitis</td>
<td>30.5</td>
<td>23-38</td>
<td>2:0</td>
<td>2</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>47</td>
<td>35-56</td>
<td>2:1</td>
<td>3</td>
</tr>
<tr>
<td>Congenital</td>
<td>8</td>
<td>8</td>
<td>0:1</td>
<td>1</td>
</tr>
</tbody>
</table>
DISCUSSION

The study undertaken at our center showed similar results to various other studies in which the abducens was most commonly involved and trochlear least involved. Abducens was involved in 46.7% similar to these studies showing 40-57% occurrence. The mean age of this series was 41.17±14.38 years. The age of onset in 2 reports was higher 52.3 and 62.5 years. This may be due to only acquired cases being taken into account while in this study congenital cases were included. Excluding the congenital case, however, mean age was still lower at 42.31 years. Furthermore, in this study, the finding that trauma was the most common cause and not vascular cause as in the other studies may be the reason for the lower age of onset. However, another study reported a somewhat younger onset age of 48.1 years.

Earlier studies by Rucker showed neoplasms and undetermined causes as more common. In this study, the most common etiology was trauma unlike in other studies where vascular disease (31.1%) was the most common etiology. This may be due to our center being a referral center where medicolegal cases and road traffic accidents are referred, thus accounting of higher incidence of trauma cases.

Vascular cause accounted for 50% of 6th nerve palsies. Park et al. and Patel et al. also showed increased incidence of vascular causes for 6th nerve palsy. All patients were diabetic with 71.4% having hypertension too. Patel et al. have shown increased association for diabetes compared to hypertension.

Trauma was the most common cause of 3rd nerve involvement in this study. Another study showed that vascular disorders accounted for 34.9% of the 3rd nerve dysfunction, while it accounted for only 14.2% in our study. Pupil was involved (71.4%) in all but one case of trauma and tumor-pituitary adenoma whereas in the vascular palsy the pupil was spared. Berlit reported a 63% pupillary sparing which is explained by increased incidence of vascular lesions unlike in our study.

Trochlear nerve involvement was most commonly due to trauma and occurred in a younger age group, while combined nerve palsy was more commonly due to inflammatory cause, namely, Tolosa-Hunt syndrome.

Trauma equally involved 3rd and 6th nerve in this study whereas the 3rd nerve was found to be the most susceptible to damage in head-injured patients in other studies. Vascular ocular nerve palsy commonly involved the 6th nerve (87.5%) followed by 3rd nerve (12.5%). 4th nerve was not affected. Patients with vascular causes were older than those with traumatic cause (55.75 vs. 36.73 years). Traumatic causes were more seen in males compared to females (63.6% vs. 36.4%) while vascular causes showed a female predilection (62.5% vs. 37.5%). This may be explained by the fact that males are more predisposed to trauma. 100% vascular cases were diabetic, 75% both diabetic, and hypertensive with 87.5% 2 or more risk factors. However, vascular risk factors were also present in 22.7% cases due to other causes, but only with one risk factor. Of these, those with hypertension were seen to have subdural bleed following trauma. The hypertension may have predisposed to the bleed. Hence, it is important not to diagnose based on vascular risk factor history only. It is important to ask for a history of trauma and perform a detailed neurological evaluation as even a trivial trauma can predispose to intracranial bleed especially in those with vascular disease. Hence, appropriate neuroimaging may be required in such cases. A study conducted by Pineles et al. showed that in palsies presumed to be microvascular a significant number on follow-up were found to be due to other causes.

Demyelination was found to account for 14.3% of 6th nerve palsies in this study with no cases of 3rd or 4th nerve involvement. Other reports show multiple sclerosis to be responsible for 4.9% of unilateral 6th nerve palsy in the general population. The lower incidence in these studies may be because they took place before advances in neuroimaging with undetermined causes accounting for a sizable proportion of cases. These large retrospective...
studies found multiple sclerosis to account for 1.7% of 3rd nerve palsies. Trochlear nerve involvement in multiple sclerosis has also been reported. However, in this study no cases of 3rd or 4th nerve involvement were seen probably due to the smaller sample size.

Other causes such as Tolosa-Hunt syndrome and meningitis were associated with combined nerve palsies. One was a case of tuberculous meningitis. An Indian study had earlier described a high incidence of tuberculous meningitis in ocular nerve palsy unlike earlier studies by Rucker and attributed it to the high incidence of tuberculosis in the country.

CONCLUSION

Abducens was the most commonly involved nerve followed by 3rd nerve while trauma was most common etiology in our study. However, vascular cause accounted for 50% cases of 6th nerve palsy. Vascular risk factors were even found in non-vascular causes of nerve palsy. Demyelination was also found to be a cause of 6th nerve palsy.

Hence to reach an etiological diagnosis, investigations should be tailored to each patient according to clinical findings and provisional diagnosis.

ACKNOWLEDGEMENTS

We would like to thank Dr. Thomas Iype, Head of Department, Department of Neurology for his valuable advice during the conduct of this study.

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Control of Shivering with Butorphanol and Tramadol under Spinal Anesthesia - A Comparative Study

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Abstract

Introduction: Shivering is a common occurrence in anesthesia practice. It is an involuntary, rhythmic and intermittent muscle contraction beginning in the head and neck, extending to the extremities and culminating in generalized shaking.

Aim: To compare the effectiveness of butorphanol and tramadol in control of post-spinal shivering.

Methods: This prospective randomized study was conducted in 40 patients who developed shivering under spinal anesthesia during various general surgical and urological procedures. On shivering, patients were randomly allocated to receive an intravenous, 1ml bolus dose of 50 mg tramadol or 1mg butorphanol. Control of shivering, time taken for cessation, recurrence and hemodynamic changes were noted and compared for both groups. Collected data were analyzed using appropriate statistical tests.

Result: A statistically significant abolition of shivering in 1 and 3 min was observed after administering butorphanol than tramadol. There was no significant difference in hemodynamic variations between both groups. Though both the groups showed an increase in heart rate and diastolic blood pressure during shivering it normalized after control of shivering.

Conclusion: Both butorphanol and tramadol were effective for relieving post-operative pain; Butorphanol had an edge over tramadol in controlling shivering with lower chances of recurrence.

Key words: Butorphanol, Perioperative shivering, Spinal anesthesia, Tramadol

INTRODUCTION

Shivering, an involuntary oscillatory muscular activity, is a physiological response to core hypothermia in an attempt to raise the metabolic heat. Prolonged impairment of thermoregulatory autonomic control under anesthesia along with the cold environment of the operating room and cold infusion fluids, contribute to a fall in core body temperature and hence shivering.¹² Other known causes of shivering include transfusion reactions, drug reactions, pre-existing high-grade fever or bacteremia, or infusion of contaminated intravenous (IV) fluids (fungal growth in dextrose containing fluids). Perioperative hypothermia is the most common cause of shivering. In a shivering patient, oxygen consumption may increase by 200-500% along with a linear increase in carbon dioxide production.³ Thus in a patient with limited myocardial oxygen reserve or coronary disease, shivering may further compromise myocardial function.⁴ Shivering also increases intraocular and intracranial pressure and may contribute to increased wound pain, delayed wound healing and delayed discharge from post-anesthetic care.² Apart from being an uncomfortable experience, its deleterious effects warrant primary prevention and prompt control on occurrence.

Various pharmacological therapies aim to prevent or treat shivering includes opioids (pethidine, nalbuphine, or tramadol), ketanserin, propofol, granisetron, doxapram,
physostigmine, clonidine, and nefopam but debate on an ideal anti-shivering drug continues.\textsuperscript{2,5} Tramadol hydrochloride, a µ-opioid receptor agonistic drug, has a modulator effect on central monoaminergic pathways and thus inhibits the neuronal uptake of noradrenaline/serotonin and encourages hydroxytryptamine secretion which resets the body temperature regulation center. It has gained a reputation in many clinical trials for the control of shivering. Butorphanol an easily available opioid acts through kappa and mu receptor agonistic modulation.\textsuperscript{6} This clinical trial was set out to compare the efficacy of butorphanol and tramadol for controlling perioperative shivering of surgical patients under spinal anesthesia. Secondary outcomes included perioperative variations in hemodynamic parameters and the incidence of adverse effects among the groups.

**Aim**

To compare the effectiveness of butorphanol and tramadol in control of post-spinal shivering.

**MATERIALS AND METHODS**

Patients with American Society of Anesthesiologists Physical Status I-II, posted for procedures (urological and general surgical procedures) under spinal anesthesia, who developed shivering during the intra- or post-operative period (up to 2 h), were included in the study. Patients with hypo or hyperthyroidism, morbid obesity (body mass index of \( \geq 40 \text{ kg/m}^2 \)), fever (axillary temperature \( >37^\circ\text{C} \)) and compromised cardiorespiratory functions were excluded.

The cases were randomly allocated to two groups. Group T received an IV bolus of 50 mg (1 ml) tramadol. Group B received an IV bolus of 1 mg (1 ml) butorphanol.

In all cases, standard monitors were attached in the operating room, and baseline parameters were recorded. IV fluids infused were at room temperatures, and ambient temperature of the operating room and recovery room was maintained at 22-28°C. Spinal anesthesia was performed with a 25 or 26 G Quincke spinal needle, in a sitting position, at the L3-4 interspace with bupivacaine (0.5% heavy) in a dose of 2.4-3.2 ml, to achieve a desirable level of T6-8 dermatome, in accordance with the surgical procedure. After induction of spinal anesthesia, patients were observed for the occurrence of shivering until the post-operative period. The intensity of shivering was graded on a scale 0-3 as:

- 3=Gross muscular activity involving the entire body, bed shaking (severe).

Only cases that developed shivering of grade 2 or 3 during the perioperative phase were given treatment on an intention to treat basis. At the onset of shivering (grade 2 or 3), all patients were given oxygen via face mask at 5L/min and 1 ml of studied drug as per group allocation. Shivering control was defined as complete when post-treatment, the shivering score declined to 0, incomplete when the scores decreased but did not abolish the shivering completely and failed if no change in scores was observed.

The time taken for cessation of rigors and hemodynamic changes was recorded at regular 5 min intervals up to 20 min. Recurrence of shivering if any was noted and recorded and treated with pethidine in a dose of 0.5 mg/kg.

**RESULTS**

Demographic data and duration of surgery were found to have no statistically significant difference between the groups. In the 1st min. after administration of the drugs, there was a significant relief in the abolition of shivering with butorphanol than tramadol. Only six patients in the tramadol group had relief whereas 14 patients in the butorphanol group had relief in the 1st min. There was a recurrence of shivering noted in one patient in the tramadol group after 20 min. whereas no such episodes were noted in the butorphanol group. No statistically significant change in heart rate or blood pressure (BP) was observed in both the groups for 20 min (Figure 1). A drop in systolic BP of around 10 mm Hg, an increase in diastolic BP and increase in heart rate was observed in both the groups during the onset of shivering (Figures 2 and 3). There were no reports of nausea and vomiting in any patient during the intra-operative period. Grade 1 sedation was observed in butorphanol treated groups whereas no sedation was noted with tramadol. No episode of respiratory depression was noted in both groups as oxygen was supplemented throughout the intra-operative period.

**DISCUSSION**

Shivering presents as a common perioperative problem causing hypertension, tachycardia and increased metabolic demands. It also interferes with intra-operative monitoring of electrocardiogram, BP, and oxygen saturation. Various risk factors associated with shivering include type and duration of anesthesia, level of sensory blockade, age, temperature of the operating room, and infusion fluids.

In our study, butorphanol was quicker compared to tramadol in suppressing shivering whereas in the study
conducted by Bansal and Jain.\(^7\) The time taken for complete abolition of shivering in both the groups were almost same. One case of recurrence of shivering was observed in our study and none in butorphanol group which is in contrast to the observations made by Maheswari et al. who observed a lower rate of recurrence with tramadol than butorphanol.\(^6\)

Clonidine was found to be inferior to tramadol and butorphanol in the control of shivering with a higher rate of recurrence. A higher fall in systolic and diastolic BP and an increase in heart rate was found in the clonidine group after treatment of shivering than in other two groups. In our study, we found a rise in diastolic BP and increase in heart rate during shivering which normalized after treatment with tramadol or butorphanol.\(^7\)

Shukla et al. compared the effects of clonidine and tramadol in shivering control and found that shivering got controlled earlier with clonidine than tramadol. Two patients of clonidine group and one patient in tramadol group developed bradycardia. Three patients in clonidine group developed hypotension. No similar hemodynamic effects were observed in our study.\(^8\)

Joshi et al. observed that tramadol and butorphanol were similar in their ability to control shivering under spinal anesthesia in contrast to our study where butorphanol was superior to tramadol, which was statistically significant. There was no difference in hemodynamic parameters in all the three groups pre-shivering, intra-shivering, or post-shivering whereas, in our study, we observed a rise in diastolic BP and heart rate during the onset of shivering.\(^9\)

Butorphanol was quicker than pethidine in abolishing shivering successfully. Relapse is more in pethidine than butorphanol.\(^10\)

**CONCLUSION**

Butorphanol is superior to tramadol for the management of post-operative shivering due to higher rates of success, earlier onset of action and lesser recurrence with comparable safety. At present, opioids hold a high reputation as reliable anti-shivering agents, though the search for an ideal substitute still continues.

**REFERENCES**


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Problem of Obesity among School Going Adolescent in Rural Practice Area of Indira Gandhi Institute of Medical Sciences, Patna

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Abstract

Background: Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and developing countries. Overweight and obesity in adolescent are associated with hypertension, dyslipidemia, cholesterolemia, and reduce glucose metabolism that has an impact on the physical health and can lead to an increase in the risk of early illness and death in later life.

Aims and Objective: This study was conducted to determine the prevalence of overweight and obesity among school going adolescent as well as their association with different risk factors, demographic, socioeconomic status, physical activity levels, and the food consumption pattern of children.

Materials and Methods: A school-based cross-sectional study was conducted during March 2016 to February 2017 among school going adolescent students of rural practice area of Indira Gandhi Institute of Medical Sciences, Patna. A total number of 540 students aged group 12-17 years enrolled in class 8th, 9th, and 10th were included in the study. A semi-structured questionnaire such as demographic profile and other factors related with obesity was administered to the students to collect data. Body mass index was calculated as weight (in kg) divided by height (in m²). The P value ≤ 0.05 were considered statistically significant. All data were compiled, tabulated, and analyzed using SPSS I8 version software. Chi-square test was applied to find out the significance between sex and rural school adolescent students with respect to childhood obesity.

Results: A total of 540 students were included in this study. Among these, 276 (51%) were boys and 264 (49%) were girls. Overall, the prevalence of overweight and obesity was found to be 10.37% and 6.30%, respectively. The prevalence of overweight was maximum in middle adolescent (53.58%). The prevalence of overweight and obesity was found higher among female adolescent students (57.14% and 58.82%) as compared to male adolescent students (42.86% and 41.18%), respectively. The prevalence of overweight and obesity was found higher in students belonging to socioeconomic Class I (50.00% and 47.06%) followed by socioeconomic Class II (35.71% and 41.17%), respectively.

Conclusion: There is crucial need to provide awareness programs and health education to spread healthy messages on good nutrition and good health for the prevention of obesity.

Key words: Body mass index, Obesity, Overweight, School adolescent

INTRODUCTION

Obesity is a condition of unusual or excessive fat accumulation in the adipose tissue to the extent that health may be impaired (World Health Organization [WHO], 1997). Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and
developing countries. The WHO has declared overweight as one of the top 10 health risks in the world and one of the top five in developed nations. The factors associating to increasing childhood obesity are increased intake of high-calorie food that are low in vitamins, minerals, and micronutrients coupled with physical activity. The WHO predicts that by 2015 approximately 2.3 billion adults will be obese (WHO, 2004). In India, many studies have shown that the prevalence of overweight among adolescent (10-19 years) varies between 10% and 30%. The prevalence of overweight and obesity is highest in Punjab (30%), followed by Kerala (28%), and Delhi (26%). Low level of physical activity, watching TV, and consuming junk/fast foods are associated with a higher prevalence of overweight and obesity. The National Family Health Survey 3 (NFHS-3) 2005 - Rural data showed that unite prevalence of obesity was 9.3% and 12.6% among man and women aged 15-49 years, respectively. There are many studies done in India from 2002 to 2012 indicate a rising tendency in the prevalence of overweight and obesity in children and adolescents. This may have major complications toward high prevalence of noncommunicable disease such as diabetes mellitus, hypertensions, and cardiovascular disease in early adulthood. Diet and lifestyle are ostensibly major contributors to weight problems and varies with different socioeconomic status (SES) especially countries like India. Obesity is becoming a public health concern, especially among the urban population. This is attributed to the changes in lifestyle, for example, individuals have shifted from active to sedentary, changes in dietary habits; foods consumed are mostly carbohydrates and fats which provide more calories than what is expected. This study was done to know the prevalence of overweight and obesity among adolescent in Bihar using the Khadikar’s Asian Indian guidelines for children and adolescent which corresponds to an adult equivalent body mass index (BMI) of 23 and 28 kg/m², respectively.

### Aims and Objective
This study was conducted to determine the prevalence of overweight and obesity among school going adolescent as well as their association with different risk factors, demographic, socioeconomic status (SES), physical activity levels, and the food consumption pattern of children.

### Inclusion Criteria
Adolescent students aged 12-17 years who gave consent/or whose parent gave consent to be a part of this study was included in the study.

### Exclusion Criteria
1. Students not consenting and cooperative for anthropometry/or whose parents did not give consent to be a part of the study.
2. Adolescent students with chronic major illness as well as those on corticosteroid therapy and chromosomal disorder were excluded from the study.

### MATERIALS AND METHODS
A school based cross-sectional study was conducted during March 2016 to February 2017 among school going adolescent students of rural practice area of Indira Gandhi Institute of Medical Sciences Medical College, Patna. There are totally three government schools selected randomly from a list of schools obtained from the school authorities. Possibility accordingly to size of the population technique was used to decide the number of students to be studied from each school and then subsequently from each class. A total number of 540 students aged group 12-17 years enrolled in class 8th, 9th, and 10th were included in the study. Out of them, 276 were boys and 264 were girls. The study protocol was approved by Institutional Ethical Committee. Prior informed consent was obtained from the principals of the selected schools. After obtaining the informed permission and assuring full confidentially to the participants, a semi-structured questionnaire was administered to the students. Question was asked about sociodemographic profile and other factors related with obesity. The body weight was measured in kg using a standardized weighing machine. Weight of all student was taken using electronic weighing scale, and the students were asked to stand upright, without shoes on the weighing machine looking straight while the measurement was read. Height was to measure in cm using a portable stadiometer. Height was taken using a standard three-piece anthropometric rod at their classroom corrected up to 1 mm. Students were asked to stand upright against a wall with the heels touching the wall and chin held horizontally so that the tragus of the ear and eye are in straightway, then the stick was adjusted and the height in cm was read. BMI was calculated as weight (in kg) divided by height (in m²). For children and adolescent, after BMI was calculated for children and adolescent, the BMI number is ground plan on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentage ranking. Percentage are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. All data were compiled, tabulated in Microsoft Excel 2013 software and data were analyzed using SPSS 18 Version. The P value ≤ 0.05 were considered statistically significant. Chi-square test was applied to find out the significance between sex and rural school adolescent students with respect to childhood obesity.

### RESULTS
A total of 540 students were included in this study. Among these, 276 (51%) were boys and 264 (49%) were girls (Table 1).
It shows the distribution of age, sex, and SES in this study. The overall prevalence of overweight and obesity was found to be 10.37% and 6.30%, respectively. The prevalence of overweight was maximum in middle adolescent (53.58%). The prevalence of overweight and obesity was found higher among female adolescent students (57.14% and 58.82%) as compared to male adolescent students (42.86% and 41.18%), respectively. The prevalence of overweight and obesity was found higher in students belonging to socioeconomic Class I (50.00% and 47.06%) followed by socioeconomic Class II (35.71% and 41.17%), respectively (Tables 1 and 2).

It shows that the students of illiterate father’s and mother’s education had the highest prevalence of overweight and obesity (42.86% and 41.18% and 35.72% and 47.06%), respectively. While the students of father’s and mother’s university education had the lowest incidence of overweight and obesity (10.71% and 11.76% and 17.86% and 5.88%), respectively. The relation between the level of father’s and mother’s education and obesity was founded to be significant (P < 0.001).

Table 1: Sociodemographic characteristics and prevalence of overweight and obesity among adolescent

<table>
<thead>
<tr>
<th>Variables</th>
<th>N (%)</th>
<th>Overweight</th>
<th>Obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Age</td>
<td>540 (100)</td>
<td>56 (10.37)</td>
<td>34 (6.30)</td>
</tr>
<tr>
<td>Early adolescence</td>
<td>112 (20.74)</td>
<td>08 (14.28)</td>
<td>06 (17.64)</td>
</tr>
<tr>
<td>Middle adolescence</td>
<td>248 (45.92)</td>
<td>30 (53.58)</td>
<td>18 (52.94)</td>
</tr>
<tr>
<td>Late adolescence</td>
<td>180 (33.34)</td>
<td>18 (32.14)</td>
<td>10 (29.42)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>276 (51.00)</td>
<td>24 (42.86)</td>
<td>14 (41.18)</td>
</tr>
<tr>
<td>Female</td>
<td>264 (49.00)</td>
<td>32 (57.14)</td>
<td>20 (58.82)</td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class-I</td>
<td>54 (10.00)</td>
<td>28 (50.00)</td>
<td>16 (47.06)</td>
</tr>
<tr>
<td>Class-II</td>
<td>210 (38.89)</td>
<td>20 (35.71)</td>
<td>14 (41.17)</td>
</tr>
<tr>
<td>Class-III, IV, V</td>
<td>276 (51.11)</td>
<td>08 (14.29)</td>
<td>04 (11.77)</td>
</tr>
</tbody>
</table>

SES: Socioeconomic status

Table 2: Distribution of overweight and obesity according to father’s and mother’s education in the studied sample

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Normal N=450 (%)</th>
<th>Overweight N=56 (%)</th>
<th>Obese N=34 (%)</th>
<th>χ²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fathers education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>46 (10.23)</td>
<td>24 (42.86)</td>
<td>14 (41.18)</td>
<td>231.6</td>
<td>0.00++</td>
</tr>
<tr>
<td>Read and writing</td>
<td>120 (26.67)</td>
<td>16 (28.57)</td>
<td>10 (29.42)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School (up to high school)</td>
<td>160 (35.55)</td>
<td>10 (17.66)</td>
<td>06 (17.64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>124 (27.55)</td>
<td>06 (10.71)</td>
<td>04 (11.76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>132 (29.33)</td>
<td>20 (35.72)</td>
<td>16 (47.06)</td>
<td>9.29</td>
<td>0.00++</td>
</tr>
<tr>
<td>Read and writing</td>
<td>96 (21.34)</td>
<td>14 (25.00)</td>
<td>12 (25.30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School (up to high school)</td>
<td>124 (27.55)</td>
<td>12 (21.42)</td>
<td>04 (11.76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>98 (21.78)</td>
<td>10 (17.86)</td>
<td>02 (5.88)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* indicate is significant P value and ++ indicate is highly significant P value, significant P value (≤ 0.05) and highly significant P value (< 0.01)

Table 3 it shows the prevalence of overweight/obesity in adolescent age group 12-17 years was significantly higher in girls (19.69%) in compare to males (15.94%) on the basis of BMI using the Khadikar’s Asian Indian guidelines criteria.

Table 4 it shows that there was a significant association between obesity and breakfast skipping (P = 0.44), numbers of meals as overweight and obesity associated more with meals >3 (P = 0.90), who eats snacks frequently (P = 0.01), and who eats fast food frequently (P = 0.00). Furthermore, there was a relevant association between overweight and obesity and who watch TV >2 h (P = 0.84), who eats nonvegetarian diet (P = 0.14), family history of diabetes and obesity (P = 0.00) and who did not do exercise (P = 0.46) and not participated in walking (P = 0.00), respectively. Present study show that majority of students frequently breakfast eating, more than 3 number of meals, frequently snack and fast food consumption, more than 2 h of TV watching, more nonvegetarian diet, family history of obesity, no physical activity and not participated in walking lead to higher BMI, overweight and obesity, respectively.

DISCUSSION

Obesity is one of the most prevalent nutritional problems of children and adolescent in many developed and developing countries. Overweight and obesity in adolescent are associated with hypertension, dyslipidemia, cholesterolemia, and reduce glucose metabolism that has an impact on the physical health and can lead to an increase in the risk of early illness and death in later life. The overall prevalence of overweight and obesity was found to be 10.37% and 6.30% respectively in the present study. Almost similar finding was observed in other studies. Higher prevalence of overweight and obesity was also reported by Kapil et al. who found overweight 23.1% and obesity 8.3% in males and overweight 27.7% and obesity 5.5% in females in Delhi. Our study also shows higher prevalence rates of
overweight/obesity among girls, as did a previous study done in Chennai. Similarly, Kapil et al. reported higher prevalence of overweight and obesity in females students as compared to male students. Aggarwal et al. reported the prevalence of overweight to be higher among boys than among girls in affluent adolescents from Ludhiana, Punjab. The influence of gender and adolescence on obesity can be attributed to hormonal changes at puberty and the development of secondary sexual characteristics resulting in fat accumulation and, redistribution. In the present study, there was a relevant association between overweight/obesity and parent’s education as the highest prevalence of obesity was among students with uneducated parents as they are accountable for food selection for their children as well as their lifestyle activities. This concedes with several studies carried out in the developed countries which describe this association by the belief of uneducated parents that overweight children are healthier than normal weight children. Hence, they prefer large calories food which causes obesity their children. While other studies carried out in developing countries revealed that the

Table 3: School and gender-based prevalence of overweight and obesity in adolescent

<table>
<thead>
<tr>
<th>Criteria used: Khadikar’s Asian Indian criteria</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adolescent of government school:</td>
<td></td>
</tr>
<tr>
<td>Boys (N=276)</td>
<td></td>
</tr>
<tr>
<td>BMI≥23-27.99</td>
<td>36 (13.04)</td>
</tr>
<tr>
<td>BMI≥28</td>
<td>08 (2.89)</td>
</tr>
<tr>
<td>Over all</td>
<td>44 (15.94)</td>
</tr>
<tr>
<td>Girls (N=264)</td>
<td></td>
</tr>
<tr>
<td>BMI≥23-27.99</td>
<td>42 (15.90)</td>
</tr>
<tr>
<td>BMI≥28</td>
<td>10 (3.78)</td>
</tr>
<tr>
<td>Over all</td>
<td>52 (19.69)</td>
</tr>
<tr>
<td>BMI: Body mass index</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Dietary and life style factors associated with overweight and obesity in the studied school adolescent

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Normal N=450 (%)</th>
<th>Overweight N=56 (%)</th>
<th>Obese N=34 (%)</th>
<th>χ²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>36 (8.00)</td>
<td>06 (10.72)</td>
<td>04 (11.76)</td>
<td>0.575</td>
<td>0.44+</td>
</tr>
<tr>
<td>Sometimes</td>
<td>284 (63.12)</td>
<td>22 (39.28)</td>
<td>12 (35.30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent</td>
<td>130 (28.88)</td>
<td>28 (50.00)</td>
<td>18 (52.84)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3</td>
<td>164 (36.44)</td>
<td>24 (42.86)</td>
<td>10 (29.42)</td>
<td>0.014</td>
<td>0.90+</td>
</tr>
<tr>
<td>&gt;3</td>
<td>286 (63.56)</td>
<td>32 (57.14)</td>
<td>24 (70.58)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snacks</td>
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<tr>
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<td>10 (29.42)</td>
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<tr>
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<td>120 (26.67)</td>
<td>28 (50.00)</td>
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<td>Fast food consumption</td>
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<td>154 (34.22)</td>
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<td>Hours of TV watching</td>
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<td>&lt;2 h</td>
<td>224 (49.78)</td>
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<td>&gt;2 h</td>
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<td>32 (57.14)</td>
<td>22 (64.72)</td>
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<td>Exercise</td>
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<td></td>
</tr>
<tr>
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<td>64 (14.22)</td>
<td>32 (57.14)</td>
<td>21 (61.77)</td>
<td>85.55</td>
<td>0.00++</td>
</tr>
<tr>
<td>Sometimes</td>
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<td>16 (28.58)</td>
<td>08 (23.53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequent</td>
<td>154 (34.22)</td>
<td>08 (14.28)</td>
<td>05 (14.70)</td>
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<tr>
<td>Walking</td>
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<td>&lt;1 h/day</td>
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<td>07 (20.58)</td>
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<td></td>
</tr>
<tr>
<td>&gt;1 h/day</td>
<td>60 (13.33)</td>
<td>10 (17.64)</td>
<td>03 (08.83)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* indicate is significant P value and ++ indicate is highly significant P value
highest prevalence of obesity was among students with high educated parents due to parental style with low energy expenditure.\textsuperscript{21,22}

This study sheds light on the dietary behavior and lifestyle of the general government school children's. Skipping breakfast is associated with overweight/obesity in children and adolescents.\textsuperscript{23,24} In our study showed a significant association between skipping breakfast and overweight as well as obesity. This could be described as skipping breakfast leads to eating energy dense, less nutritious snacks and fast foods later during the school hours to compensate this lost meal. In the current study, there was also a significant association between obesity and number of meals. This agrees with Guven et al.\textsuperscript{19} study which revealed that the obese adolescents choose energy dense food.

This study showed an important association between obesity and snack intake due to its high fat and glucose content. This runs with several studies which found a significant relation between BMI and eating snack.\textsuperscript{25,26} Furthermore, we revealed a significant association between obesity and frequent fast food consumption due to its high fat and calories. This concides with the study conducted by Jeffery et al.\textsuperscript{27} who found a significant relation between BMI and fast food. Similar results were obtained by another investigator.

In the present study, there was a relevant association between obesity and hours of TV watching decreases energy expenditure by spending less time on performing physical activity and increases their consumption of obesogenic foods during watching. This is in consensus with the study conducted by Munakata et al.\textsuperscript{28} who demonstrated a significant relation between BMI and TV watching in Japan. Our studies showed an important association between obesity and eating while watching TV, which is constant with many studies.\textsuperscript{29,30} On the other hand, Zaal et al.\textsuperscript{12} did not find a significant association between obesity and eating meals while watching TV as the fat content of the foods was more important than the amount of food consumed during TV watching.

In this study, we found the prevalence of overweight and obesity are more in nonvegetarian diet children compare to vegetarian diet children. Such information in various studies in children permits individual diets to be related to subsequent health outcomes. This agrees with the study conducted by Rockett and Colditz.\textsuperscript{31}

The prevalence of overweight and obesity are more in children with family history of diabetes and obesity.\textsuperscript{32} In the present study, we found that family history of obesity was more likely to have more prevalence of obesity and overweight than those having family history of diabetes. On the other hand, our results correlate with the previous study by King et al.\textsuperscript{33} which recommend that family history of obesity have more prevalence to obesity than family history of diabetes. This indicates that children having a family history of obesity are more likely to become obese or overweight.

Our study revealed a significant association between physical activity and fewer incidences of overweight and obesity as walking to the school and performing some physical exercises at the school time lead to an increased energy expenditure. This agrees with previous studies.\textsuperscript{34,35} On the other hand, some studies did not find a significant association between obesity and physical activity.\textsuperscript{36}

CONCLUSION

The prevalence of overweight and obesity among school going adolescent aged 12-17 years at RHTC, Maner was relatively high due to low level of parent education, breakfast skipping, light meal taking, fast food ingestion, nonvegetarian diet, TV watching more than 2 h/day, and finally physical inactivity showed a strong association with a higher BMI lead to overweight and obesity in children. Countrywide provide awareness programs and health education to spread healthy messages on good nutrition and good health for the prevention of obesity and its consequences need to be initiated. These shall not only encourage good health but shall also help in the prevention of noncommunicable diseases as diabetes, coronary heart disease, hypertension, and other related diseases. School authority should provide healthy school snacks, playing field appliances and promote physical activity regularly. On the long run, such program shall act to reduce the burden on economic growth of the nation.

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A Study of Psychiatric Morbidity Among Patients with Early-onset Psoriasis

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Introduction: Psoriasis is a chronic inflammatory skin condition which leads to cosmetic disfigurement. This leads to shame and stigmatization, more so in patients with onset <20 years along with significant psychosocial burden, poor body image, and low self-esteem.

Purpose: To study the relationship between severity of psoriasis and psychiatric morbidity, the relationship between age of onset and severity of psychiatric morbidity, the severity of psychiatric symptoms compared with the site of psoriasis, and to assess the quality of life (QOL) using the dermatological life quality index.

Materials and Methods: A total of 50 consecutive, consenting patients attending the psoriasis clinic, were included into our study group. 50 consenting age-, sex-, and education-matched normal people were taken as controls. psoriasis area severity index (PASI) was administered by the dermatologist. Then, general health questionnaire was administered to screen for psychiatric symptoms. The patients who scored positively were assessed for anxiety, depression, and suicidal ideation using Hamilton depression rating (HAM-A), HAM-D, and Beck’s suicide inventory. Stress was assessed by Holmes and Rahe life stress inventory and self-esteem by Rosenberg self-esteem scale.

Results: Psoriasis patients were found to have increased anxiety (40%), increased depression (36%), and increased suicidal ideation (32%) when compared with controls. 60% had reduced self-esteem. Self-esteem was affected more (77%) than patients with onset after 20 years. The QOL was equally affected in both age groups. PASI scores were found to be statistically significantly ($P < 0.001$) associated with an increase in severity of anxiety and depression.

Conclusion: Psychiatric comorbidity is greater among patients with psoriasis. Anxiety, depression, and suicidal tendencies are significantly higher in early-onset psoriasis. Poor QOL and low self-esteem are significantly more among patients with psoriasis. Clinicians caring for patients will be doing a greater service by paying attention to these invisible burdens, such as anxiety and depression.

Key words: Anxiety, Depression, Early onset, Psoriasis area severity index, Suicidal ideation

INTRODUCTION

Psoriasis is a chronic disfiguring inflammatory and proliferative skin condition in which both genetic and environmental factors play a critical role. Many environmental factors such as stress, sunlight, infections, trauma, endocrinological factors, drugs, alcohol, and smoking have been linked to psoriasis and have been implicated in the initiation of disease pattern and exacerbation of pre-existing disease.1 Psoriasis is made worse by psychological distress in 30-40% of patients. More than 60% of patients believe that stress was a principal factor in the cause of their psoriasis and that this was unrelated to psoriasis area severity index (PASI).2 Farber and Nall3 determined that in about 40% of patients, there was occurrence of psoriasis and in 37% patients, it worsened following stress. Psoriasis patients often feel stigmatized by their disease and are often rejected and humiliated by others.4 These feelings of social rejection and stigma were associated with disrupted work experience, psychiatric...
help-seeking, and alcohol consumption. Early-onset psoriasis (psoriasis with onset <40 years) has been associated with more severe and recurrent course. Early-onset psoriasis is also more frequently associated with psychosocial factors such as stress and alcohol consumption.

Recently, psychological intervention has also proved to be a valuable adjunct to normal dermatological treatment, resulting in early improvement in majority of patients by Coopre et al. Since there are not many studies supporting this observation, more prospective clinico-epidemiological studies using appropriate psychometric instruments for assessing the quality of life (QOL) are required for better understanding of disease burden. The purpose of this study was to assess the QOL and psychiatric morbidity of patients, including suicidal ideation and the role of stress on psoriasis, and to provide an early psychological intervention in adjunct to dermatological treatment for good outcome.

**Purpose**

**Primary objective**
To study the psychiatric comorbidity in patients with early-onset psoriasis as compared with normal control groups

**Secondary objectives**
1. To study the relationship between severity of psoriasis and psychiatric morbidity.
2. To study the relationship between age of onset and severity of psychiatric morbidity.
3. To study the severity of psychiatric symptoms compared with the site of psoriasis.
4. To study the relationship between the sociodemographic profile and psychiatric morbidity.

**MATERIALS AND METHODS**

This was a case-control study conducted in the outpatient clinic of the Department of Dermatology, Madras Medical College, Chennai, a tertiary care hospital in Tamil Nadu. The period of study was from September 2013 to November 2013. This study was approved by the Institutional Ethical Committee. All participants (both patients and control group) gave informed consent for participation in written form. For those who were illiterate, consent form was read to them and they were requested to put their thumb impression if they consent for participation. The inclusion criteria were psoriasis vulgaris patients confirmed by a dermatologist, age of onset psoriasis <40 years, and age of patient at presentation <60 years. The exclusion criteria were age of onset of psoriasis >40 years, patients who have comorbid physical complaints, patients who have severe mental illness, mental retardation, and are uncooperative, and patients who do not have a diagnosis of psoriasis confirmed by a dermatologist.

A total of 50 consecutive, consenting patients attending the psoriasis clinic, Rajiv Gandhi Government Hospital were included into our study group. 50 consenting age-, sex-, and education-matched normal people were taken as controls. PASI was administered by the dermatologist. The study population was administered the semi-structured pro forma. Then, general health questionnaire (GHQ) was administered to screen for psychiatric symptoms. The patients who scored positively were assessed for anxiety, depression, and suicidal ideation using Hamilton depression rating (HAM-A), HAM-D, and Beck’s suicide inventory. Stress was assessed by Holmes and Rahe life stress inventory and self-esteem by Rosenberg self-esteem scale. Dermatology life quality index (DLQI) measured the QOL. Chi-square test and correlation analysis were used using the SPSS software.

**RESULTS**

Out of the sample of 100, taken for our study, 36% \((n = 17)\) of patients (cases) fell into the age group of 25-35 years. Out of this, 48% \((n = 24)\) were male and 52% \((n = 26)\) were female. 36% \((n = 18)\) were homemakers and 22% \((n = 11)\) were laborers. 64% \((n = 32)\) were married and 50% of the patients had completed at least high school. Most of the patients hailed from an upper-lower socioeconomic status \((34%, n = 17)\) and 86% \((n = 43)\) followed Hinduism. 64% \((n = 32)\) of the patients declared that they did not abuse any substance. 36% of study population had onset of psoriasis at an early age (Table 1).

Hamilton anxiety rating scale is a commonly used scale which measures the severity of a patient’s anxiety on the basis of 14 parameters. It was developed by Hamilton in the year 1959. The parameters included are anxious mood, fears, tension, insomnia, somatic complaints, and behavior at the time of interview. In addition to being a diagnostic tool, it is helpful to document the results of pharmacotherapy. Each question is scored from 0 to 4. A score of 0-17 indicates mild anxiety, 18-25 indicates mild to moderate, and 26-30 means moderate to severe. Total

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Case Group</th>
<th>Control Group</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18</td>
<td>6 (12.0)</td>
<td>3 (6.0)</td>
<td>9 (9.0)</td>
</tr>
<tr>
<td>18-25</td>
<td>5 (10.0)</td>
<td>8 (16.0)</td>
<td>13 (13.0)</td>
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<tr>
<td>25-35</td>
<td>17 (34.0)</td>
<td>19 (38.0)</td>
<td>36 (36.0)</td>
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<tr>
<td>35-45</td>
<td>13 (26.0)</td>
<td>14 (28.0)</td>
<td>27 (27.0)</td>
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<tr>
<td>&gt;45</td>
<td>9 (18.0)</td>
<td>6 (12.0)</td>
<td>15 (15.0)</td>
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<tr>
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</table>
scores above 30 are severe anxiety and such scores are very rare. In our study, patients scored significantly \( P = 0.006 \) higher than controls on HAM-A scale. 42\% \( (n = 21) \) of patients had mild anxiety and 22\% \( (n = 42) \) had moderate anxiety as compared to 40\% \( (n = 20) \) and 4\% \( (n = 2) \) of controls, respectively (Table 2).

Hamilton rating scale for depression is a 17-item questionnaire, which provides an indication of depression and also guides to assess recovery. It was published originally by Max Hamilton in 1960. The questionnaire rates the severity of their depression by probing their mood, feelings of guilt, agitation, insomnia, anxiety, suicidal ideation, somatic symptoms, and weight loss. It contains 17 items to be rated. Each item is scored on a 3-point or 5-point scale. Depending on each item, the total score is then compared to the corresponding descriptor. A score of 0-7 is normal, 10-13 indicates mild depression, 14-17 means mild to moderate, and >17 moderate-to-severe depression. Estimated assessment time is 20 min. In our study, 36\% \( (n=18) \) of psoriasis patients fulfilled the criteria for moderate depression and 10\% \( (n=5) \) for very severe depression. This was significantly \( P < 0.001 \) higher than the control groups where 16\% \( (n=8) \) had moderate depression and none had very severe depression (Table 3).

DLQI is a self-reported questionnaire which measures the QOL in the past week. It has ten items. First 2 items cover symptoms and feelings. 3\textsuperscript{rd} and 4\textsuperscript{th} items measure daily activities. Leisure is measured by items 5 and 6, problems in work and school indicated by item 7, and personal relationships by items 8-10 scores treatment-related issues. Each item is scored on a 4-point scale, higher scores indicating greater impairment in the QOL. The maximum score is 30 and minimum score 0. Scale is attached in the annexure. The DLQI is useful for adults in patients over age 16. In our study, psoriasis was observed to have a significantly larger \( P < 0.001 \) effect on the QOL. DLQI scores revealed that psoriasis had very large effect on 26\% \( (n=13) \) of patients and extremely large effect on 18\% \( (n=9) \) of patients. There was no effect on 46\% \( (n=23) \) and 42\% \( (n=21) \) of the control group (Table 4).

Beck’s suicide intent scale was developed by Beck \textit{et al.} in 1979. It is a questionnaire administered by an interviewer, containing 21 items. It measures a patient’s current intensity of a particular behavior and plans to commit suicide on that day of the interview. Each item has 3 options graded from 0 to 2. Total score ranges from 0 to 38. The Beck’s suicide intent scale comprises five screening items. 3 items evaluated the wish to live or die and two items, the desire to attempt suicide. 14 additional items are administered if any respondent reports a desire to commit suicide. In our study, “desire to be dead” was expressed by 32\% \( (n=16) \) of psoriatic patients. This was significantly \( P < 0.001 \) higher than control group \( 4\% , n = 2 \) (Table 5).

Rosenberg self-esteem questionnaire is a scale devised for estimating the self-esteem of a patient. It was devised by Rosenberg in the year 1965. It is a 10-item scale that measures global self-worth by measuring both positive and

### Table 2: Anxiety scores among cases and controls

<table>
<thead>
<tr>
<th>HAM-A score</th>
<th>Group</th>
<th>Total n (%)</th>
<th>P-value</th>
</tr>
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<td>Case</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( n (%) )</td>
<td>( n (%) )</td>
<td></td>
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<td>No anxiety</td>
<td>16 (32.0)</td>
<td>28 (56.0)</td>
<td>44 (44.0)</td>
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<tr>
<td>Mild</td>
<td>21 (42.0)</td>
<td>20 (40.0)</td>
<td>41 (41.0)</td>
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<tr>
<td>Moderate</td>
<td>12 (24.0)</td>
<td>2 (4.0)</td>
<td>13 (13.0)</td>
</tr>
<tr>
<td>Severe</td>
<td>2 (4.0)</td>
<td>0 (0.0)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>Total</td>
<td>50 (100.0)</td>
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### Table 3: Depression scores among cases and controls

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<th>HAM-D score</th>
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<th>P-value</th>
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<td>Case</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( n (%) )</td>
<td>( n (%) )</td>
<td></td>
</tr>
<tr>
<td>No depression</td>
<td>8 (16.0)</td>
<td>28 (56.0)</td>
<td>36 (36.0)</td>
</tr>
<tr>
<td>Mild</td>
<td>12 (24.0)</td>
<td>12 (24.0)</td>
<td>24 (24.0)</td>
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<tr>
<td>Moderate</td>
<td>18 (36.0)</td>
<td>6 (16.0)</td>
<td>24 (26.0)</td>
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<tr>
<td>Severe</td>
<td>7 (14.0)</td>
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<td>9 (9.0)</td>
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<tr>
<td>Very severe</td>
<td>5 (10.0)</td>
<td>0 (0.0)</td>
<td>5 (5.0)</td>
</tr>
<tr>
<td>Total</td>
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### Table 4: Distribution of DLQI among cases and controls

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<tbody>
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<td>Case</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( n (%) )</td>
<td>( n (%) )</td>
<td></td>
</tr>
<tr>
<td>No effect</td>
<td>4 (8.0)</td>
<td>23 (46.0)</td>
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<td>Small</td>
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<td>21 (42.0)</td>
<td>31 (31.0)</td>
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<td>Moderate</td>
<td>14 (28.0)</td>
<td>6 (12.0)</td>
<td>20 (20.0)</td>
</tr>
<tr>
<td>Very large</td>
<td>13 (26.0)</td>
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<td>13 (13.0)</td>
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<tr>
<td>Extremely large</td>
<td>9 (18.0)</td>
<td>0 (0.0)</td>
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<tr>
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<td>50 (100.0)</td>
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### Table 5: Suicidal ideations among cases and controls

<table>
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<tr>
<th>Beck’s suicide inventory</th>
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<th>P-value</th>
</tr>
</thead>
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<td>Case</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( n (%) )</td>
<td>( n (%) )</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>34 (68.0)</td>
<td>48 (96.0)</td>
<td>82 (82.0)</td>
</tr>
<tr>
<td>Yes</td>
<td>16 (32.0)</td>
<td>2 (4.0)</td>
<td>18 (18.0)</td>
</tr>
<tr>
<td>Total</td>
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<td>50 (100.0)</td>
<td>100 (100.0)</td>
</tr>
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</table>
negative feelings about self. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree. Items 2, 5, 6, 8, and 9 are reversed scored. Higher scores indicate higher self-esteem. In our study, with respect to self-esteem, 60% ($n = 30$) of patients had a poor self-esteem, which is significantly higher ($P < 0.001$) than control groups. Only 26% ($n = 13$) of control groups had lowered self-esteem (Table 6).

Holmes and Rahe stress scale was developed by the psychiatrists Thomas Holmes and Richard Rahe by examination of records of over 5000 medical patients to find out whether stressful events might cause illness.\textsuperscript{10} It comprises 43 life events. These are based on relative scores. Here, the number of life changing units that apply to events in the previous 1 year is calculated and the final score would be given, which indicates a rough estimates of how stress affects health. This scale is applicable to adults. In our study, Holmes and Rahe stress scale scores indicated that 54% ($n = 27$) had moderate stress which was significantly ($P < 0.001$) higher than control groups where only 10% ($n = 5$) had moderate stress (Table 7).

GHQ was devised by Goldberg and has been translated in 38 languages, thus standing a testimony for its validity and reliability. It is a screening tool to detect those at risk or those who are having psychiatric illnesses, such as anxiety, depression, or somatic symptoms. It is available in different versions such as 12, 28, 30, or 60 items. Each item is scored from 0 to 3 for 4 responses such as not at all, no more than usual, rather more than usual, and much more than usual. In for the version containing 12 items, caseness threshold is 3. In our study on GHQ, there was a significant ($P = 0.043$) increase in psychiatric symptoms with increase in PASI score (Table 8).

PASI is the most commonly used measures of psoriasis severity. For computing PASI scores, the four main areas assessed are the head corresponding to 10%, trunk corresponding to 20%, upper extremities corresponding to 30%, and lower extremities corresponding to 40% of total body surface area. The maximum score is 72. Studies also show an inverse relationship between psoriasis and QOL. In our study, an increase in PASI scores was found to be significantly ($P < 0.001$) associated with an increase in the severity of anxiety. Of the individuals who had a PASI of more than five, 33% ($n = 5$) had mild anxiety, 46.7% ($n = 7$) had moderate anxiety as measured on the HAM-A (Table 9). Increase in PASI was also found to be significantly associated with the severity of depression ($P < 0.001$) on the HAM-D scale. About 30% of patients ($n = 3$) who had mild depression had PASI score $<3$. 48% ($n = 12$) of patients who had moderate depression fell into the group to 3-5. Out of the patients who had PASI $>5$, 33% ($n = 5$) has severe depression (Table 10). High PASI score was associated with significant number of individuals

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having suicidal ideation (53.3%, n = 8). Of the patients who scored between 3 and 5 on PASI, 52% (n = 13) had low esteem. There was a significant increase in the severity of psoriasis (P = 0.009) as the stress increased. About 52% (n = 13) of patients who had moderate stress felt into PASI score of 3-5 and 66.7% (n = 1) had PASI score of more than 5. In our study, relationship between stress and number of relapses revealed that stress was not significantly related to the number of relapses (P = 0.662).

The relationship between severity of anxiety and age of onset showed individuals who had psoriasis onset at <20 years had significant levels of (P = 0.067) moderate anxiety (n = 7, 38.9%) and severe anxiety (5.6%, n = 1) compared to those with onset between 20 and 40 years.

In our study, the relationship between DLQI versus age of onset, DLQI was affected in the same way in both <20 years of age and >20 years of age (P = 0.198). Self-esteem was found to be significantly (P = 0.04) poor in 77.8% (n = 14) patients whose age of onset was <20 years, compared to 50% (n = 16) in patients whose age of onset was after 20 years of age.

When screened with GHQ, psoriatic patients scored significantly (P = 0.014) more than controls. 74% of patients (n = 37) scored more than 15 on GHQ when compared to 56% (n = 56) of normal controls. Distribution of GHQ scores among cases and controls showed that the psoriatic patients scored significantly (P = 0.014) more than controls. 74% of patients (n = 37) scored more than 15 on GHQ when compared to 56% (n = 56) of normal controls. Severity of depression among the two age groups revealed that there was no significant difference (P = 0.387) in the severity of depression among the two groups of patients (<20 and >20 years).

Although relationship between anxiety and educational status was not statistically significant (P = 0.078), there was a clear trend of patients with less educational qualification (high school) qualifying for mild (n = 23, 51%) and moderate anxiety (n = 3, 60%). In our study, the relationship between the anxiety and socioeconomic status, 24% of upper-lower socioeconomic status (n = 11) qualified for mild anxiety and 60% (n = 3) of patients who qualified for severe anxiety belonged to the lower-middle-class group. The relationship between depression and socioeconomic status showed that 36% of patients (n = 9) of patients who had moderate depression belonged to the lower middle-class group, though this was not statistically significant (P = 0.068).

The relationship between stress and education status revealed 40% of patients (n = 15) with moderate anxiety and 100% of patients (n = 9) who had severe depression belonged to the high school category. This was statistically significant (P = 0.001). The relationship between stress and socioeconomic status showed that the patients belonging to the lower-middle-class group scored significantly (P = 0.001) high for stress, 47.2% (n = 25) having mild stress, 37.8% (n = 14) moderate stress, and 33.3% (n = 3) severe stress.

**DISCUSSION**

The primary aim of this study was to assess the psychiatric comorbidity in individuals with psoriasis. It is a well-known fact that psoriasis is a chronic, disfiguring, and often stigmatizing dermatological condition. The course of this illness is often punctuated by remissions or exacerbations. The course of psoriasis has been closely related to the individual’s psychological status. Increased levels of stress, anxiety, and depression are a cause for exacerbation or precipitation of psoriasis. On the other hand, severity of psoriasis determines the levels of stress, anxiety, and depression experienced by the patient. Therefore, early recognition and management of psychiatric morbidity are very important for better dermatological management of psoriasis. In an effort to better understand the psychiatric morbidity experienced by patients with psoriasis with early onset (<40 years) and matched healthy controls, we undertook this study.

About 52% of our study populations were female. This is contrary to Indian studies, which have shown a higher prevalence in males by Kaur et al. One possible reason for this difference could be the fact that more women, most of them homemakers, seek dermatological services so as to gain societal and familial acceptance. Only two of our patients revealed a family history, which is contrary to the solid scientific evidence base for genetic inheritance of psoriasis by Gudjonsson et al. This could possibly reflect the reluctance of our patients to part with intimate details about their family and also their perceptions about this stigmatizing disease.

In an interesting observation, 32% of the married individuals had consistently low PASI scores. Thus, married individuals have less severe form of psoriasis. Our observation of milder PASI scores in married individuals encourages us to speculate whether marital status has a possible etiopathological role to play in psoriasis.

This study has revealed that individuals with psoriasis had higher levels of anxiety, depression, and poorer QOL (as measured by the DLQI), than the matched controls. This anxiety, depression, and stress were associated with lower
Previous studies by Kotruljai et al.,15 reported that individuals with late-onset psoriasis (>40 years) had greater levels of psychological distress, probably representing a greater challenge for the self-confidence of the patients. In this study, we attempted to replicate the above findings by deciding to compare individuals with onset of psoriasis <20 years and those with onset above 20 years.

Individuals with psoriasis onset <20 years, were found to have greater levels of depression and significantly poorer self-esteem as measured on Rosenberg self-esteem scale. The cosmetic disfigurement and changes in self-image produced by the illness from a very young age are contributing factors for these findings. Studies by Fortune et al.2 have reported that individuals who develop psoriasis at a young age have poor self-confidence, self-image, and greater levels of depression. Individuals with psoriasis onset <20 years of age were more anxious than persons with psoriasis onset >20 years. However, this difference, though not statistically significant, showed a trend toward higher levels of moderate anxiety among the younger group of patients. Surprisingly, these two groups did not differ much on DLQI. Thus, despite having higher levels of anxiety, depression, and lower self-esteem, patients with younger age of onset of psoriasis revealed greater levels of resilience in living with the illness. Another possible speculative explanation for the finding could be that younger individuals are more likely to have integrated the physical changes into their self-image and thereby displaying a greater level of endurance in withstanding the illness.

In the GHQ, all the patients achieved scores which were significantly higher compared to controls. Patients who achieved scores >15 and >20 also scored higher on PASI scale. Individuals with PASI scores between 3-5 and >5 scored significantly higher (P = 0.043) on the GHQ. This finding coincides with that of the study done by Lena et al.16

Patients with psoriasis had significantly higher anxiety and depression when compared with matched controls. They also had poorer self-esteem, poor QOL, and higher suicidal ideation. These were statistically significant between the two groups. The above findings coincide with the studies done by Gupta et al.17 and Akay et al.18

Other studies investigating the relationship between PLQI and QOL in psoriasis have found a poor correlation.2,8 Studies by Gupta et al.16 and Neimer et al.19 have also found that depression is related to the visibility of psoriatic plaques and the presence of pruritus. In our study, most of the patients had multiple psoriatic lesions on the exposed parts of the body. In spite of this, our patients clearly expressed that their illness did not affect either their social or occupational spheres of life.

An increase in PASI scores significantly correlated with an increase in the numbers of patients experiencing stress. Individuals with PASI scores between three and five and scores >5 mostly expressed difficulties in social and occupational areas. Stress in these patients was related to “reduction in number of get-togethers,” “change in acceptance by others,” and loss of job on the Holmes Rahe scale. All these patients perceived stress to be a precipitating factor for their illness. Individuals with more relapses (>5) were found to have higher stress than those with lesser than five relapses. However, this difference was not statistically significant. Interestingly, all individuals with more than five relapses had scored >5 on PASI. These observations clearly underscore the importance of early psychiatric intervention to achieve better dermatological outcomes. Lena et al.12 had hypothesized that individuals with late-onset psoriasis had a greater susceptibility to exogenous factors. This study is not in concordance with the above hypothesis.

CONCLUSION

Psychiatric comorbidity is greater among patients with psoriasis. Anxiety, depression, and suicidal tendencies are significantly higher in early-onset psoriasis. Poor QOL, low self-esteem, and also significantly more among patients with psoriasis. Clinicians caring for patients with psoriasis will be doing a greater service by paying attention to these invisible burdens, such as anxiety and depression. Improving patient’s psychological well-being lessens disease burden and increases the QOL. The results of this study should be confirmed by larger, well-defined future studies.

REFERENCES


Comparison of the Outcome of Ventricular Septal Defect Closure using Gore-Tex and Glutaraldehyde-treated Autologous Pericardium

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INTRODUCTION

The most common congenital cardiac anomaly, ventricular septal defect (VSD),1-3 may occur as an isolated anomaly or as a part of a complex of anomalies such as tetralogy of Fallot. Small defects may close spontaneously and others may cause no significant disability in an entire lifetime. Patients with cardiomegaly and large left-to-right shunts are unquestionable candidates for the operation. By operating electively, the tendency to develop bacterial endocarditis and valvulitis is virtually eliminated.4,5

In this study, we propose to follow-up patients undergoing repair for VSD over 1 year and look at the variables in relation to the different techniques of operation, materials used for closure, and eventual morbidity and mortality related to the operation.

VSD closure is the most common congenital cardiac surgical procedure.1 Synthetic materials such as Dacron and Gore-Tex patches are used for VSD repair. Previously, Goretex (W.L. Gore and Associates, Inc. Newark) was used exclusively in our unit. Autologous pericardium is attractive because it is free, easily available, and sterile.

Experience with bovine pericardial patch closure of congenital VSD is limited.2 We report our experience with glutaraldehyde-treated autologous pericardium for VSD closure in our congenital cardiac surgical practice.

Isolated VSD is a well-known congenital heart anomaly. If discovered in infancy or early childhood surgical intervention...
can be of necessity depending on the size of the defect, to assure a healthy adulthood. The long-term results of surgical closure of VSD in childhood are good and after surgery the children are considered as equally healthy and physically fit as their peers. However, there is inconsistency in data regarding follow-up on this group of patients, in relation to exercise capacity as a measure of the cardiopulmonary function. To further approach this matter the post-operative cardiac factors of these patients have to be investigated.6-10

Aims

A comparison of glutaraldehyde-treated autologous pericardium and Gore-Tex patch for closure of VSD.

MATERIALS AND METHODS

All patients undergoing repair for VSD in the Department of Cardiothoracic Surgery at Government Rajaji Hospital were included in the study. Patients with VSD associated complex anomalies were excluded from the study. Group 1 used Gore-Tex patch for VSD closure and Group 2 used glutaraldehyde-treated autologous pericardium patch for the VSD closure.

After routine median sternotomy, the thymus was carefully dissected from the pericardium and partially removed. A free graft of the pericardium was harvested, taking care not to injure the phrenic nerves. It was stretched out on a stiff, sterile cardboard paper to avoid wrinkles. It was treated with 0.6% glutaraldehyde solution for 20 min and rinsed 3 times in 0.9% saline for 5 min.

Cardiopulmonary bypass was established with aorta, superior vena cava, and inferior vena cava cannulation. Under moderate hypothermia (28-30°C) and antegrade cold blood cardioplegic arrest, the right atrium was opened and the VSD was inspected. The pericardial/Gore-Tex patch was trimmed to match the size of the VSD. The defect was closed with the pericardial patch using 4/0 or 5/0 polypropylene continuous suture; starting from the inferior margin and proceeding toward the anterosuperior margin and superiorly toward the aortic valve, avoiding injury to the aortic cusps. With the second arm of the suture, the posteroinferior margin was closed up to the septal leaflet of the tricuspid valve. The tricuspid margin of the defect was closed with a reinforcing strip of pericardium. When using interrupted sutures, pledget-supported interrupted mattress sutures are first placed around all margins of the defect and then passed through an approximately tailored patch, which is lowered down and tied in.

Additional Procedures

Two patients underwent simultaneous aortic valve repair. One patient needed division of hypertrophied infundibular muscle and other needed excision of subaortic membrane. Mitral valve repair done in two patients.

RESULTS

A total of 58 patients were recruited for the study. Of these, 21 had VSD repair using glutaraldehyde-treated autologous pericardial patch and 24 had VSD repair using Gore-Tex patch. In 13 patients, the VSD was small and was closed using direct prolene sutures reinforced with teflon pledgets. Majority of patients were in the age group of 6-10 years comprising 43% of the total study population. Children under 5 years of age comprised <10% of the study group. Male and female patients almost equally distributed in our study with 51.7% of patients are female. Perimembranous VSD contributes major in our study with 37.9% followed by subpulmonic VSD (Table 1). Most of the VSD operated were of restrictive physiology. The non-restrictive type included mainly the VSD of outlet type (Table 2).

The most common associated anomaly was congenital mitral valve abnormality, mainly cleft mitral valve, and chordal prolapsed leading to significant mitral regurgitation requiring mitral valve repair. Right ventricular outflow tract (RVOT) obstruction was due to hypertrophied RV muscle bundle which required the division of the muscle bundle to relieve the obstruction. Two patients had significant aortic regurgitation due to aortic valve prolapsed. Surgeons using Gore-Tex patch for VSD repair favored the interrupted suture technique and surgeons using glutaraldehyde-treated autologous pericardium favored the continuous suture technique. Pericardial patch used in 36.2% of cases and Gore-Tex patch used in 41.4% of cases. Pledged prolene suture closure done in 22.4% of cases (Table 3).

Mortality is 8.6% in our cases. 48% of cases had morbidity most of them are minimal complications recovered in the post-operative period (Table 4).

31% of cases had minimal residual shunt in the immediate post-operative echo and they are on follow-up with medical management (Table 5).

Two patients had infective endocarditis in Gore-Tex patch group. Residual shunt was present in 18 patients; none of them were significant enough to warrant re-exploration and closure. Two patients had nodal rhythm in Gore-Tex patch group and needed temporary pacing. They recovered after 1 week.

Gore-Tex patch closure cases dominate with residual shunt with 45.8% of residual shunt. We use continuous technique...
for most of pericardial patch closure and interrupted suturing for Gore-Tex closure (Table 6).

DISCUSSION

A total of 58 patients were recruited for the study. Of these, 21 had VSD repair using glutaraldehyde-treated autologous pericardial patch and 24 had VSD repair using Gore-Tex patch. In 13 patients, the VSD was small and was closed using direct prolene sutures reinforced with teflon pledges. 65% of patients had restrictive hemodynamics. The remainder had large VSD of mainly subaortic type. The most common VSD was outlet type comprising 50% of the study population. Muscular VSD was the least common with only 8% of the population. Continuous suture techniques were used in 40% of the study group. Most of the patients in the continuous suture technique group were from the pericardial group. Pericardial patch treated with glutaraldehyde was more flexible and had better handling properties compared to the Gore-Tex patch was a contributing factor for ease of surgery. The rest had interrupted suture technique and all of them were from the Gore-Tex group. They were mainly operated on by a single surgeon during this study duration and it may have contributed to the use of the same technique in this group. The most common associated anomaly was congenital mitral valve abnormality, mainly cleft valve, and chordal prolapsed leading to significant mitral regurgitation requiring mitral valve repair. Chordal shortening was done and cleft in the anterior leaflet was closed 5-0 prolene sutures. Post-operatively, one patient who underwent mitral valve repair needed prolonged ventilation and tracheostomy due to residual mitral regurgitation and cardiac failure. He was weaned off ventilator and tracheostomy tube was removed before discharge.

RVOT obstruction was commonly due to the hypertrophied RV bundle which required division of the muscle bundle to relieve the obstruction. Two patients had significant aortic regurgitation due to aortic valve prolapsed. They were approached using transaortic route and modified Trusler’s repair was done to correct the prolapsed right coronary cusp. One patient had anomalies muscle bundle in RV along with subaortic membrane and both were excised. PFO were closed.

All the patients except three were closed using transatrial approach. MV repair was done through interatrial septum. Two patients needing aortic valve repair were approached through aortic exposure and one patient with subpulmonic VSD was repaired through transpulmonary approach. Two patients had nodal rhythm in Gore-Tex patch group and needed temporary patching. They recovered after 1 week. Two patients had infective endocarditis in Gore-Tex patch group. Residual shunt was present in 14 patients; none of them significant enough to warrant re-exploration and closure. Two patients suffered neurological deficits in the immediate post-operative period. Computed tomography scan of brain showed areas of infarct in one of the patient and cerebral edema in the other. Both of them were managed with antiedema measures and recovered.

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VSD: Ventricular septal defect

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VSD: Ventricular septal defect

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successful. When seen at 1-year follow-up both of them had regained full functional recovery. One patient had pre-renal failure in the immediate post-operative period and was managed conservatively. His renal parameters returned to normal baseline levels in 5 days.

Post-operative echo showed residual shunt in 18 patients. None of them were significant enough to warrant re-exploration and closure. None of them were from the Gore-Tex patch group and majority was outlet type of VSD. The residual shunt was significantly more in interrupted suture technique and whom Gore-Tex was used for VSD closure, irrespective of the type of VSD.

Two patients in the Gore-Tex group had infective endocarditis and were successfully treated with antibiotics based on culture reports for 3 weeks duration. Of the four patients who died in the immediate post-operative period, three died of post-operative cardiac failure and one patient due to post-operative pulmonary hypertensive crisis. Majority of the complications were in the group operated by a single surgeon. This may have contributed to the differences in complications rate in this series when compared to other standard data published.

Limitations

This study is limited by its non-randomized nature and the inherent limitations of non-randomized studies. Only those patients who were referred for surgery and underwent surgical repair were reviewed. Indications for surgery are based on the retrospective review of the referring cardiologist’s clinical notes and the surgical pre-operative note. Although this study did not address long-term follow-up for these patients, long-term survival and clinical outcome for patients after surgical closure of isolated VSD is consistently excellent, and we would anticipate the same for this study population. In addition, we intentionally excluded patients with multiple VSDs. We recognize patients with multiple VSDs can be a challenging group for the surgical repair. However, the focus of this study was patients with isolated, single VSDs.

CONCLUSION

Autologous pericardium is easily available, sterile, and non-immune reaction. Fixation in 0.6% glutaraldehyde improves its handling qualities and reduces the risk of aneurysmal dilatation. In our experience, the handling characteristics of glutaraldehyde-treated autologous pericardium are better than other materials. We also find that the elastic glutaraldehyde-treated autologous pericardium is more in harmony with septal movements than synthetic prosthetic materials. Moreover, the incidence of infective endocarditis is reduced post-operatively. In a country like ours with limited financial resources, glutaraldehyde-treated autologous pericardium is a good alternative material to be used for repair of VSD.

REFERENCES


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Sonographic Spectrum of Inguinoscrotal Mass Lesions

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Abstract

Background and Objectives: Scanning of inguinoscrotal region is needed when clinical examination does not identify any significant abnormality. For patients presenting with inguinoscrotal masses, it is critical to determine whether the mass is intra- or extra-testicular. High-resolution ultrasonography (US) combined with color Doppler US has become the imaging modality of choice for evaluating inguinoscrotal diseases. US is helpful in differentiating extra from intratesticular lesions and in inguinal lesions. US provides excellent anatomic detail; when color Doppler and power Doppler (PD) imaging are added testicular perfusion can be assessed.

Materials and Methods: Data for the study were collected from 60 patients attending/referred to Maharani Laxmi Bai Medical College and Hospital, Jhansi, Uttar Pradesh. The gray scale and color Doppler sonography routinely performed in all these patients. Subsequently, these cases were followed up and correlated with either surgical and laboratory findings, response to treatment or follow-up scans whichever applicable.

Results: This study was undertaken to evaluate the multifold data obtained by high-resolution gray-scale sonography, color Doppler flow imaging, and PD in the evaluation of scrotal pathology. A total of 60 patients from all age groups with signs and symptoms related to inguinoscrotal diseases have been included in this study. All the 60 patients were properly followed up sonographically/medically/surgically/pathologically as per indication, to arrive at the final diagnosis. The final diagnosis was extratesticular fluid collection in 16 cases, acute inflammation in 10 cases, varicoceles in 9 cases, epididymal cysts in 6 cases, and chronic inflammation in 4 cases, testicular tumor in 2 cases, and torsion of testis in 1 case. The rest of the lesions included malposition testis, inguinoscrotal hernia, testicular microlithiasis, and scrotal wall abscess and filariasis.

Conclusion: High-frequency US when supplemented with color Doppler sonography is sensitive in diagnosing acute scrotal pathology. It is also highly sensitive in differentiating solid from cystic inguinoscrotal masses, as well as intratesticular from extratesticular origin of scrotal masses. High-frequency US with Doppler is highly sensitive in demonstrating the varicoceles. We conclude that high-frequency US and color Doppler play an important role in the diagnosis and proper management planning of the inguinoscrotal disorders.

Key words: Color Doppler, Inguinoscrotal high frequency, Ultrasonography

INTRODUCTION

Scrotum is a cutaneous bag containing the right and left testis, epididymis, and lower part of the spermatic cord. Externally, scrotum is divided into right and left parts by a ridge or median raphe, which is continued forward onto the under surface of the penis and backward along midline of the perineum to the anus.

High-resolution ultrasonography (US) combined with color Doppler US has gradually become the imaging modality of choice for evaluating inguinoscrotal diseases. The diagnosis of the inguinoscrotal pathologies primarily rests on clinical history and careful physical examination. However, in many patients, clinical symptoms are non-specific and often misleading. Clinical symptoms and physical examination are often not enough for definite diagnosis due to pain and swelling that limit an accurate palpation of the scrotal contents. Inguinoscrotal abnormalities can be associated...
with two main complaints, which is pain and mass. Causes of inguinoscrotal pain include inflammation (epididymitis, epididymo-orchitis, and abscess), testicular torsion, testicular trauma, testicular tumor, and obstructed inguinal hernias. This study has been undertaken to determine the role of US in the diagnosis of inguinoscrotal disorders in patients of all ages.

US provides excellent anatomic detail; when color Doppler and power Doppler (PD) imaging are added, testicular perfusion can be assessed. Sonography is simple to perform, rapid, non-invasive relatively inexpensive, easily reproducible, widely available, and does not involve irradiation of gonads.

**Aims and Objectives**

This study carried out with following aims and objectives:

- To assess the role of high-resolution sonography and color Doppler as primary imaging modality in the diagnosis of inguinoscrotal mass lesions
- To classify inguinoscrotal lesions into testicular and extratesticular
- To study the clinicoradiological spectrum of inguinoscrotal lesions
- To detect testicular ischemia with color flow and power mode Doppler.

**MATERIALS AND METHODS**

This study was undertaken to evaluate the multifold data obtained by high-resolution gray-scale sonography (usg Machines SA 8000SE [Medison] and SONOACE X 8 [Medison]), color Doppler flow imaging (CDFI), and PD in the evaluation of scrotal pathology. A total of 60 patients from all age groups with signs and symptoms related to inguinoscrotal diseases have been included in this study.

All the 60 patients were properly followed up sonographically/medically/surgically/pathologically as per indication, to arrive at the final diagnosis.

**RESULTS**

The present study was undertaken to evaluate the role of high-resolution sonography, color Doppler, and PD in the evaluation of inguinoscrotal pathology. A total of 60 patients from all age groups (Table 1) with signs and symptoms related to scrotal diseases (Table 2) have been included in this study. All the cases were properly followed up sonographically/medically/surgically/pathologically wherever indicated to arrive at the final diagnosis.

In sonographic findings, hydrocele was present in 13 (21.7%) cases (Table 3), followed by acute inflammation in 10 (16.7%) cases, and varicoceles in 9 (15%). Other pathologies were chronic inflammation, torsion, and testicular tumors. Epididymal cyst, spermatocele, inguinoscrotal hernia, testicular trauma, hematocoele, pyocele, testicular microlithiasis, scrotal wall abscess, and undescended testis were encountered occasionally (Tables 4 and 5).

**DISCUSSION**

Majority of the patients were between 21 and 40 years of age (56.7%) and the predominant group in this study was...
21-30 years comprising 20 patients (33.3%). This is possibly because of the repeated minor trauma to the testes due to the strenuous activity performed by the persons in this age group and also because, both the inflammatory and neoplastic diseases of the scrotum are more common in this age group. Testicular tumors are frequent in the age group of 15-35 years. Deland et al. in their study of inflammatory conditions of testes found that mean age of presentation in their study was 22 years.

Unilateral scrotal swelling was the most common presentation (78.3%). Other symptoms included bilateral swelling and infertility. Few patients presented with a combination of symptoms, the most common one being pain and swelling.

Fluid collections were the most common abnormality detected on sonography. Hydrocele was seen in 13 (21.7%) cases and was the most frequent type of fluid collection. These were subsequently proved on aspiration and cytology. Thus, accuracy of 100% was achieved in diagnosing hydrocele on sonography. Most common type of hydrocele was the one with the fluid being confined to tunica vaginalis cavity (100%). Martin et al., 1996 also described similar sonographic features in hydrocele of spermatic cord.

In the present study, 10 (16.6%) patients with acute inflammation of scrotal structures were noted. Out of these, most patients were in age group 21-40 years, that is, sexually active young males. At final diagnosis, there were 2 cases of orchitis (20%), 4 cases of epididymitis (40%), and 1 case (10%) of funiculitis, and some of the patients had more than one of the above three pathologies in different combinations. Three of the patients had simultaneous involvement of testis and epididymis and cord, were diagnosed as case of epididymitis with funiculitis. Epididymis was the most common anatomical structure involved in acute inflammation (4 out of 10 cases [40%]). Gray-scale sonography demonstrated abnormality in all these cases (100% accuracy). In 3 cases, epididymis was enlarged in size. Diffuse involvement in 2 cases (50%). Enlargement of epididymis with altered echotexture was the most common pattern of involvement (Figure 1a and b). In 2000, Xavier et al. also described similar findings in cases of acute epididymitis.

Doppler sonography showed increased blood flow in the affected epididymis and testis (100% accuracy). There was hyperemia in the affected structure. Thus, Doppler sonography proved to be better than gray-scale sonography in the diagnosis of acute inflammatory conditions. Similar findings were suggested by Horstman et al., 1991. CDFI revealed increased intratesticular blood flow in involved testis as compared to normal contralateral testis. Garriga et al., 2000 suggested that PD is more helpful than color Doppler in evaluation of acute inflammatory conditions.

In this series, nine cases of varicoceles were included. All of these cases were correctly diagnosed. They comprised 15% of total number of cases. Varicoceles have been reported to be present in 10-15% of adult men by Meecham et al., 1994.

On gray-scale sonography, varicoceles were seen as multiple, hypoechoic, serpigenous, and tubular structures larger than 2 mm in diameter, visible superior, and/or lateral of the testis (Figure 2). Color Doppler depicted blood flow within these tubular channels. These findings were in accordance with those of Dogra et al., 2003.

Three cases of scrotal hernias were noted in the study. Omentum was seen herniating into the inguinoscrotal region in one case while bowel loops were seen in two cases.

### Table 4: Extratesticular lesions (n=45)

<table>
<thead>
<tr>
<th>Extratesticular pathology</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocele</td>
<td>13 (28.9)</td>
</tr>
<tr>
<td>Acute epididymitis</td>
<td>4 (8.9)</td>
</tr>
<tr>
<td>Varicocele</td>
<td>9 (20)</td>
</tr>
<tr>
<td>Chronic epididymitis</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Epididymal cyst</td>
<td>6 (13.3)</td>
</tr>
<tr>
<td>Spermatocoele</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Inguinoscrotal hernia</td>
<td>3 (6.7)</td>
</tr>
<tr>
<td>Hematocele</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Filaria</td>
<td>2 (4.5)</td>
</tr>
<tr>
<td>Funiculitis</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Pyocele</td>
<td>2 (4.5)</td>
</tr>
<tr>
<td>Fournier’s gangrene</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Scrotal wall abscess</td>
<td>1 (2.2)</td>
</tr>
</tbody>
</table>

### Table 5: Intratesticular lesions (n=15)

<table>
<thead>
<tr>
<th>Intratesticular pathology</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute orchitis</td>
<td>5 (33.4)</td>
</tr>
<tr>
<td>Torsion</td>
<td>1 (6.7)</td>
</tr>
<tr>
<td>Testicular tumor</td>
<td>2 (13.3)</td>
</tr>
<tr>
<td>Chronic orchitis (o+epi o)</td>
<td>3 (20)</td>
</tr>
<tr>
<td>Undescended testis</td>
<td>2 (13.3)</td>
</tr>
<tr>
<td>Testicular microlithiasis</td>
<td>2 (13.3)</td>
</tr>
</tbody>
</table>

o+epi o: Orchitis + epididimo orchitis
Thus, an incidence of 5% (3/60) was noted. An incidence of 7.6% was noted by Subramanyam et al., 1982 in their study.

One case of spermatocele and 6 cases of epididymal cysts were identified. Both these lesions were common in the head of epididymis. The contents were echogenic in spermatocele and anechoic in all cases of epididymal cysts (100%). Septations were noted in 2 cases of epididymal cyst (Figure 3). However, these conditions could not be reliably distinguished on the sonographic examination alone. Similar concern was shown by Krone and Carroll, 1985.

The incidence of undescended testes was 3.3% (2 out of 60) in our series. It is similar to that observed by Pinch et al. All the patients had unilateral undescended testis. The location of undescended testis was in inguinal region in all the patients (within the inguinal canal). Harrison et al. reported location of cryptorchid testes in inguinal canal in 72% and abdominal in 8% of cases. On sonography, the testes were comparative, smaller in size, and homogeneously hypoechoic in nature. Madrazo et al. described similar sonographic features of undescended testes.

In our study, testicular microlithiasis was encountered in two cases with an incidence of 3.3% (2/60). They were observed as multiple, small (1-2 mm), diffusely scattered, hyperechoic foci within testicular parenchyma without acoustic shadowing. These are incidental finding. Doherty et al. described similar findings with a reported incidence of 0.6%.

In the present study, testicular tumors were found in 2 cases (3.3%). The use of ultrasound in diagnosis of testicular tumors is well documented. In our study, tumors were found commonly from age group 0-10 years and 21-30 year's and in these age group most common tumor were found yolk sac tumor and seminoma respectively. Ultrasound is highly sensitive for detection of testicular tumors with a sensitivity of 100% in this study, however, the sample size was small. In the study carried out by Fowler et al., sensitivity was 100% and specificity was 99%. He reported that seminomas were more homogeneous in echotexture than other tumors (Figure 4).

All the 60 patients were properly followed up sonographically/medically/surgically/pathologically as per indication, to arrive at the final diagnosis.

The final diagnosis was extratesticular fluid collection in 16 cases, acute inflammation in 10 cases, chronic inflammation in 4 cases, testicular tumor in 2 cases, torsion of testis in 1 case, epididymal cysts in 6 cases, and varicoceles in 9 cases. The rest of the lesions included malpositioned testis, inguinoscrotal hernia, testicular microlithiasis, and scrotal wall abscess.

Extratesticular fluid collection was the most common scrotal pathology noted. Of this, idiopathic hydrocele was the most common abnormality observed. It featured mostly
as an anechoic collection in the tunica vaginalis cavity. All cases of hydrocele were correctly diagnosed on gray-scale sonography.

Extratesticular fluid collection following trauma and infection depicted septations. As a result, gray-scale sonography could not reliably distinguish between hematocoele and extratesticular abscess (Figure 5).

In 10 patients with acute inflammation, at the final diagnosis, there were 5 cases of orchitis (50%), 8 cases of epididymitis (80%), and 1 case (10%) of funiculitis, as some of the patients had more than one of the above three pathologies in different combinations. Doppler sonography showed increased blood flow in the affected epididymis and testes and thus showed 100% accuracy in diagnosis of acute inflammation. The most common pattern was enlarged epididymis with altered echotexture. PD proved to be more sensitive than color Doppler in detecting inflammatory pathology. PSV more than 15 cm/s and RI <0.5 were complementary to the diagnosis of acute inflammation.

In 10 patients with acute inflammation, at the final diagnosis, there were 5 cases of orchitis (50%), 8 cases of epididymitis (80%), and 1 case (10%) of funiculitis, as some of the patients had more than one of the above three pathologies in different combinations. Doppler sonography showed increased blood flow in the affected epididymis and testes and thus showed 100% accuracy in diagnosis of acute inflammation. The most common pattern was enlarged epididymis with altered echotexture. PD proved to be more sensitive than color Doppler in detecting inflammatory pathology. PSV more than 15 cm/s and RI <0.5 were complementary to the diagnosis of acute inflammation.

Gray-scale ultrasound could not well-differentiate acute torsion from acute orchitis, as both the conditions showed hypoechoic testis. The most important role of CDFI and PD was noted to differentiate equivocal gray-scale sonographic features of testicular torsion and acute inflammations. With CDFI, symptomatic testes showed the absence of vascular signals in all cases of testicular torsion (100% sensitivity).

Four patients with chronic inflammation of scrotal structures were included in the study. Majority of the patients were in the age group of 21-40 years. At final diagnosis, testes were involved in 3 cases (75%) and epididymis in 3 cases (75%), of which 1 case of orchitis and 1 case of epididymitis were proved to be tuberculous in nature. Out of the 4 cases of chronic inflammation, gray scale and Doppler sonography could diagnose abnormality in two cases and failed to detect chronic inflammatory changes in epididymis in 1 case of non-tuberculous chronic epididymo-orchitis.

In majority of these cases (2 out of 3 cases) involved, epididymitis was heterogeneous in echotexture (67%) followed by hypoechoic echotexture in one case (33%). Tuberculous epididymitis demonstrated heterogeneous echotexture of the involved epididymis along with interspersed hypoechoic nodules. Similar findings were depicted by Kim et al., 1993. The echogenicity of enlarge epididymis was relatively homogenous in patients with non-tuberculous epididymitis. This finding was also noted by Chung et al., 1997.

Testes were involved in 3 patients (75%). Sonographic features of testicular involvement comprised ill-defined areas of intratesticular hypoechoigenicity in 1 case (33.3%) and heterogeneous echopattern of testis with irregular margin between epididymis and testes in two case (66.7%). Kim et al. and Chung et al. also described similar features in their studies.

Evidence of tuberculosis in the lung was associated in 2 cases (50%). Testicular and epididymal calcification were noted in 2 cases each.

Strikingly, similar observations were noted in patients with tuberculous and non-tuberculous epididymo-orchitis by Kim et al. in a study of 12 patients. They found diffuse enlargement of epididymis in 50% of cases and involvement of tail in 25%. Testes were involved in 50% of their patients with similar sonographic features.

Nine cases of varicoceles were seen (Figure 2). However, gray-scale sonography could diagnose only 8 cases (88.9%
sensitivity). It failed to diagnose 1 case of subclinical varicoceles in infertile males, in which the venous diameter of pampiniform plexus was 2-3 mm. However, color and pulse Doppler accurately diagnosed all cases of varicoceles (100% sensitivity).

Undescended testis was noted in 2 cases. In all cases, condition was unilateral and testis was located in the inguinal canal. In both cases, undescended testis was comparatively smaller and hypoechoic.

In total, there were 7 cases of cysts in the head of epididymis, subsequently proved to be 6 cases of epididymal cyst, and 1 cases of spermatocele at the final diagnosis of the 3 cases of scrotal hernia, omentocele was seen in 1 case, and enterocoele in 2 cases.

**CONCLUSION**

In our study, most of the observations and results matched the earlier studies. However, there were few results which did not match the literature. This may be due to small sample size.

To summarize, an excellent correlation was seen in the diagnosis of scrotal lesions between sonography (gray scale, CDFI, and PD) and histopathology/surgery/treatment response. Sonography (gray scale and Doppler together) was found to be 93.33% sensitive in the diagnosis of scrotal pathology.

The present study concludes that high-resolution sonography, along with CDFI and PD should be used as first-line imaging modality in the evaluation of inguinoscrotal pathologies. CDFI and PD and useful information and complement gray-scale sonography are very much helpful in reaching a correct diagnosis.

**REFERENCES**

Audiological Evaluation of Children below 14 Years Undergoing Tympanoplasty in a Tertiary Teaching Hospital

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Abstract

Introduction: Chronic suppurative otitis media (CSOM) is at a higher incidence in the pediatric population when compared to adults. CSOM results in conductive deafness resulting in difficulty in learning speech skills. Surgical procedures to correct the hearing loss are regarded both by surgeons and parents to give poor results. Selection of children with CSOM developing speech problem and appropriate tympanoplasty in skilled hands will result in post-operative auditory gain.

Aims: To study the audiological results in children following tympanoplasty procedures in a tertiary teaching hospital.

Materials and Methods: A total of 85 children aged 9–14 years underwent tympanoplasty procedure between October 2015 and April 2017 was included in the study. Post-operative audiological evaluation, perforation closure, factors playing a role in the success rate were recorded and analyzed.

Results: Closure of perforation was successful in 92.94% of the children. Graft take failure occurred in 7.05% (6). Auditory gain of 30–35 dB in air conduction (AC) was found in 77.64% (66) and closure of a-b gap 20–30 dB was observed in 82.35% (70). 17.64% (15) children showed AC auditory gain of 20–30 dB, closure of a-b gap of 10–20 dB in 20% (17). No improvement in hearing was found in 4 (4.70%) children.

Conclusion: Tympanoplasty improves hearing in children with CSOM if performed properly. As the follow-up in the study is only 14 months, a study with a longer follow-up would suggest a definitive conclusion.

Key words: a-b gap, Air conduction, Auditory gain and myringoplasty, Chronic suppurative otitis media, Tympanoplasty

INTRODUCTION

Tympanoplasty in children is considered by many surgeons and parents as less successful than in adult patients.¹ Prior treatment of adenoiditis and chronic tonsillitis is mandatory in children undergoing tympanoplasty.² The higher incidence of otitis media in the pediatric population is often implicated as the reason for poorer results.³ There are diverse opinions among the surgeons concerning the right indications for tympanoplasty in children.⁴ Many would agree and go ahead with surgery in children with cholesteroloma de novo or with complications.⁵ The chronically draining ear that is resistant to medical therapy also requires surgery.⁶ Few surgeons advocate early surgery to correct anatomic defects and improve hearing so that their language skills are not affected. Others maintain elective surgery should be deferred until the peak incidence of acute otitis media has passed.⁷ Pediatric myringoplasty were performed as early as 1962 in the United States (1) and in the early 1970s in the United Kingdom (2).⁸ Literature in English journals quote success rate of 56–94% in children undergoing myringoplasty (3).¹⁰ The difference in success rate may be due to dissimilarity in study design and selection of cases and criteria for success rate.¹⁰ Nevertheless, a meta-analysis concluded that there was no difference associated with age in the success rate of myringoplasty.¹¹ The aim of present study was to study
audiological results in children following tympanoplasty procedures in a tertiary teaching hospital.

**MATERIALS AND METHODS**

A total of 85 children attending the ENT Department of a tertiary teaching hospital attached to NRI College, Guntur of Andhra Pradesh, India with diagnosis of chronic suppurative otitis media (CSOM) were included in the present study. An approval from the Institutional Ethical Committee of the college was obtained. An ethical committee approved consent form was used during the study.

**Inclusion Criteria**

1. Children aged between 9 and 14 were included.
2. Children with the diagnosis of CSOM (safe and unsafe) were included.
3. Children with delayed language development were included.
4. Children with purely conductive deafness were included.
5. Children operated earlier for adenoidectomy and tonsillectomy were included.
6. Children with normal X-ray paranasal sinus were included.

**Exclusion Criteria**

1. Children below 9 years and above 14 were excluded.
2. Children with sensorineural hearing loss were excluded.
3. Children with a history of using aminoglycosides in their earlier medical history were excluded.
4. Children with chronic adenoiditis and chronic tonsillitis were excluded.

Parents of the children were interviewed to elicit the mispronounced consonants and vowels and their number. A thorough history was taken, ear-nose-throat examination and endoscopy of ears and nasal cavity was done. All the children were subjected to pure tone audiometry using 500, 1000, 2000, and 4000 Hz stimuli and pure tone average (PTA) was calculated; the data collected were classified according to the loss in air conduction (AC) and level of a-b gap in dB. All the children with CSOM (unsafe) with cholesteatoma limited to auditus ad antrum without involvement of attic and mastoid antrum proper were performed intact canal wall mastoidectomy. Canal wall down was done in children with extensive cholesteatoma in attic, antrum, and middle ear. Children with safe type were performed cortical mastoidectomy with tympanoplasty. Post-aural approach was used in all operations. The temporalis fascia graft was harvested and positioned medial to the drum remnant using the underlay technique. A post-operative audiometry was done after 2 months in case of safe type and after 4 months in case of canal wall down procedures and PTA calculated. All the data were analyzed using standard statistical methods.

**RESULTS**

The mean age of children in the study group was 12.45 ± 2.30. There were 63 (74.11%) male children and the remaining were females 22 (25.88%). Children aged 9-11 years were 31 (36.47%) and children belonging to 12-14 years were 54 (63.52%). Children with CSOM (safe) were 69 (81.17%) and children with CSOM (unsafe) were 16 (18.82%). Children with CSOM (safe) were having relatively dry ears for 2 months before surgery unlike CSOM (unsafe). All the children of the study group were operated on only one ear. Among the 85 children, 23 (27.05%) had bilateral CSOM. Audiometry showed that children with AC thresholds between 40-50 dB were 34 (40%) and 20-40 dB were 51 (60%). Children with a-b gap of 25-35 dB were 46 (54.11%) and a-b gap 15-25 dB was 39 (45.88%). The ossicular status during the surgery was noted and found that children with CSOM (unsafe) had ossicular necrosis involving incus alone in 9/16 (56.25%), incus and malleus erosion in 5/16 (31.25%), and in 2/16 patients (12.5%) only stapes footplate was found (Table 1).

Successful closure of perforation was defined as an intact eardrum at 1-year post-operatively. Success in terms of improvement in hearing was defined as an improvement of 10 dB or more in two consecutive frequencies compared with the Pre-operative AC thresholds. The success rate was 51/54 (12-14 years age) 94.44% and 28/31 (90.32%) in children aged 9-11 years. Failure of the graft occurred in 6 patients (7.05%) (Table 2).

**Table 1: The age, type of CSOM, side of involvement, and audiometry data (n=85)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Male (63)</th>
<th>Female (22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-11 years (n=31)</td>
<td>22</td>
<td>09</td>
</tr>
<tr>
<td>12-14 years (n=54)</td>
<td>41</td>
<td>13</td>
</tr>
<tr>
<td>CSOM (safe) (n=69)</td>
<td>54</td>
<td>15</td>
</tr>
<tr>
<td>CSOM (unsafe) (n=16)</td>
<td>09</td>
<td>07</td>
</tr>
<tr>
<td>Unilateral (n=62)</td>
<td>49</td>
<td>13</td>
</tr>
<tr>
<td>Bilateral (n=23)</td>
<td>14</td>
<td>09</td>
</tr>
<tr>
<td>Pre-operative AC threshold - 40-50 dB (n=34)</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>Pre-operative AC threshold - 20-40 dB (n=51)</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td>Pre-operative a-b gap - 25-35 dB (n=46)</td>
<td>38</td>
<td>08</td>
</tr>
<tr>
<td>Pre-operative a-b gap - 15-25 dB (n=39)</td>
<td>25</td>
<td>14</td>
</tr>
<tr>
<td>Incus erosion - 9/16</td>
<td>05</td>
<td>04</td>
</tr>
<tr>
<td>Incus and malleus erosion - 5/16</td>
<td>03</td>
<td>02</td>
</tr>
<tr>
<td>Incus, malleus, and stapes supra</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>Stapes suprastructure - 2/16</td>
<td>01</td>
<td>01</td>
</tr>
</tbody>
</table>

CSOM: Chronic suppurative otitis media, AC: Air conduction
Auditory gain of 30-35 dB in AC was found in 77.64% (66) and closure of a-b gap 20-30 dB was observed in 79.01% (64). 17.64% (15) children showed AC auditory gain of 20-30 dB, closure of a-b gap of 10-20 dB in 20.98% (17). No improvement in hearing was found in 4 (4.70%) children. Few factors observed and predicted that they contributed in the outcome of tympanoplasty were the duration of dryness of ear, canal wall down or up procedure (Table 3).

**DISCUSSION**

CSOM with conductive deafness in children causes significant disability in day-to-day activities as well as learning of speech. Tympanoplasty is a simple and effective procedure that can reverse the process of hearing disability resulting in the successful closure of the perforation in most cases and improving hearing. However, there seems to be no consensus among otologists regarding the benefits of tympanoplasty in children. The advantages of early surgery are to prevent developing chronic ear disease; related complications, to improve hearing without the need for a hearing aid and thus, aid speech and language development and to help the child enjoy water activities. The possibility of existing persistent eustachian tube (ET) function and frequent uniform resource identifiers can reverse the process of hearing disability. Ophir suggested that early operation may prevent progression of ossicular chain resorption. Ophir et al. reported 79% overall success rate, and their success in younger children was comparable to the rate for older children. They concluded that tympanoplasty had a good chance of success at any age. Kessler et al. in the review of their 209 surgeries concluded that even in young patients (2-6 years) tympanoplasty had a higher success rate (75-94%) and that age alone could not be considered a contraindication to surgery. Hence, the outcome of Tympanoplasty depends on criteria for selection and the length of follow-up. If closure of perforation alone is taken as a measure of success, the rate is reported to be between 75% and 92%. This compares favorably with the results reported for the adult population. However the success rate can be as low as 45% when post operatively conditions like glue ear, reinsertion of ventilation tubes followed by electrostatics of middle ear occur and should be considered causes of failure. Even though the sporting life of children improves with simple healed graft avoiding contamination of the middle ear eleft and recurrentotorrhea, there is no scale to measure the improved quality of life. This makes it crucial to define the criteria of success in pediatric tympanoplasty, preferably internationally, to enable every surgeon to compare the results in a more meaningful way. In the present study, patients aged 9-14 years were included with a result of successful graft uptake was 92.94% comparable to the results of various authors. The reason for variation in results of these authors could be attributed to the wide range of age that differs in various studies, because of technique used, varying length of follow-up, and experience of surgeons. Auditory gain of 30-35 dB in AC was found in 77.64% (66) and closure of a-b gap 20-30 dB was observed in 79.01% (64). 17.64% (15) children showed AC auditory gain of 20-30 dB, closure of a-b gap of 10-20 dB in 20.98% (17). No improvement in hearing was found in 4 (4.70%) children. The causes of failure in graft healing in six children and failure in auditory gain in four children among the children with healed grafts were developing measles in one child, failure to use antibiotics in two children and children going to swimming within 4-week post-operatively in the remaining three children.

**Table 2: The success rate according to the age group (n=85)**

<table>
<thead>
<tr>
<th>Age</th>
<th>Male (63)</th>
<th>Female (22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-14 years -</td>
<td>51/54 (94.44%)</td>
<td>13</td>
</tr>
<tr>
<td>09-12 years -</td>
<td>28/31 (90.32%)</td>
<td>09</td>
</tr>
</tbody>
</table>

**Table 3: Auditory gain in children of the study (n=85)**

<table>
<thead>
<tr>
<th>Auditory gain</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC gain; 30-35 dB (n=66)</td>
<td>52</td>
<td>14</td>
</tr>
<tr>
<td>(77.64%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC gain; 20-30 dB (n=15)</td>
<td>07</td>
<td>08</td>
</tr>
<tr>
<td>(17.64%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a-b gap closure; 20-30 dB (n=64)</td>
<td>07</td>
<td>08</td>
</tr>
<tr>
<td>(79.01%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a-b gap closure; 20-30 dB (n=17)</td>
<td>07</td>
<td>08</td>
</tr>
<tr>
<td>(20.98%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AC: Air conduction
CONCLUSION

Tymanoplasty procedure is beneficial in children when performed by experienced surgeon. Proper selection of the patients, undertaking adenoidectomy, and tonsillectomy wherever indicated before tympanoplasty makes the surgery more successful. It stands a good chance in restoring hearing in children. However, a bigger study with a long follow-up is necessary to conclude definitely.

REFERENCES


How to cite this article: Sateesh N, Yarlagadda S. Audiological Evaluation of Children below 14 Years Undergoing Tympanoplasty in a Tertiary Teaching Hospital. Int J Sci Stud 2017;5(3);125-128.

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Comparative Study of Oral Mifepristone and Endocervical Prostaglandins E2 Gel as Preinduction Cervical Ripening Agent in Parturition

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Abstract

Introduction: The present day obstetrics calls for induction of labor for a myriad of obstetrical, medical, and fetal indications. We should only induce labor when we are sure that we can do better. The prostaglandins (PGs) and antiprogesterones have major role in labor induction.

Aim: The aim is to evaluate the efficacy and safety of oral mifepristone and endocervical PGE2 gel in labor induction.

Methods: To compare the efficacy of oral mifepristone and endocervical PGE2 gel as preinduction cervical ripening agents. 100 antenatal women were selected among which 50 women received 200 mg oral mifepristone and 50 women received 0.5 mg endocervical PGE2 gel.

Results: Mean increase in Bishop score in mifepristone group is 5, whereas 36 in PGE2 gel group. Oxytocin requirement for augmentation in mifepristone group is 66%, whereas 78% in PGE2 gel group. Duration of 2nd and 3rd stage of labor was shorter in mifepristone group. Cesarean section rate was higher in PGE2 gel group 24% whereas in mifepristone was 6%. Maternal complications were similar in both groups. Neonatal intensive care unit admission was 18% in PGE2 gel group whereas 10% in mifepristone group.

Conclusion: Oral mifepristone is very safe and an effective drug for preinduction cervical ripening. It is more effective in multigravida than primigravida.

Key words: Bishop score, Cervical ripening, Favorability, Induction of labor, Mifepristone, Oxytocin, Prostaglandin E2 gel

INTRODUCTION

Successful labor induction is clearly related to the state of the cervix. Women with an unfavorable cervix, who have not experienced cervical ripening phase before labor, present the greatest challenge with regard to labor induction. In addition, the duration of labor induction is affected by parity and to a minor degree by baseline uterine activity and sensitivity to oxytocic drugs. Many investigators have identified the importance of assessing cervical status before induction of labor.1 Mifepristone is a steroidal compound that has antiglucocorticoid and antiprogesterone properties. It increases uterine activity and causes cervical effacement and dilatation for pregnancy termination. The pharmacokinetics of mifepristone are characterized by rapid absorption and a long half-life of 25-30 h.2 In late pregnancy, the uterus is sensitized by mifepristone to prostaglandins (PG) and promotes cervical ripening which induces labor. Various studies conducted on induction of labor in live term pregnancies with mifepristone in doses of 200-400 mg have shown an improvement in cervical ripeness and increased rates of spontaneous labor with no serious maternal or fetal side effects.3 PGs are most commonly used pharmacological agents for ripening of cervix and PGE2 is the agent of choice for this purpose.4

Aim

The aim is to compare the safety and efficacy of oral mifepristone and endocervical PGE2 gel for the preinduction cervical ripening.

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MATERIALS AND METHODS

This comparative study was conducted in Department of Obstetrics and Gynecology at Tirunelveli Medical College Hospital to compare the efficacy of oral mifepristone and endocervical PGE2 gel as preinduction cervical ripening agents in term gestation and prolonged pregnancies and was done in uncomplicated antenatal women who had clear indication for the induction of labor. 100 antenatal women were selected for the study among which 50 women received oral mifepristone 200 mg and 50 women received endocervical PGE2 gel 0.5 mg.

Inclusion Criteria

Inclusion criteria were singleton pregnancy in cephalic presentation, post-dated uncomplicated pregnancy, term uncomplicated pregnancies with unfavorable cervix (Bishop-score < 4), intrauterine fetal death, congenitally anomalous babies, term or post-term pregnancies with no contraindications for vaginal delivery, no contraindications for PGs or mifepristone, primigravida <35 years and uncomplicated multigravida up to three pregnancies, and intact membranes during the time of induction.

Exclusion Criteria

Exclusion criteria were premature rupture of membranes, malpresentations, cephalopelvic disproportion, bad obstetric history or history of previous abortions, previous history of cesarean section or any uterine surgery, associated medical complications, multiple pregnancy, elderly primigravida (age >35 years), oligohydramnios, Rh-negative mother, placental complications such as abruption or placenta previa, abnormal fetal heart rate patterns, intrauterine growth retardation, parity >3, active herpes infection, contraindication for PGs, chorioamnionitis, and any febrile morbidity.

On admission, a detailed history and complete general and obstetric examination were carried out. Vaginal examination was done under strict aseptic precautions and the cervical status and fetal station were assessed. Gestational age calculated by Naegle’s rule and a routine obstetric scan for fetal maturity and well-being were done. Once the inclusion criteria were fulfilled and cephalopelvic disproportion was ruled out, the patient was prepared and transferred to the labor ward. Indication for induction was noted after reaffirming that there was no contraindication for induction.

Group - 1: 50 pregnant women were given tablet mifepristone 200 mg orally on day 1. They were observed for maternal vitals, uterine activity bleeding or draining pv, and fetal heart rate. After the wait period of 24 h or when the Bishop score was ≥6 or when the cervical dilatation was >2 cm or when the membranes ruptured or when the patient was well in labor whichever is earlier labor was accelerated with oxytocin drip.

Group - 2: 50 pregnant women pregnant were instilled endocervical PGE2 gel 0.5 mg on day 1. They were observed for maternal vitals, uterine activity, bleeding, draining pv, and fetal heart rate. After the wait period of 6 h or when the Bishop score was ≥6 or when the cervical dilatation was >2 cm or when the membranes ruptured or when the patient was well in labor whichever is earlier labor was accelerated with oxytocin drip.

Maternal vitals, uterine activity, and fetal heart rate were monitored clinically. Partogram was maintained for all patients and used to record all the clinical events during the course of labor. A watch for the rupture of membranes was done. If membranes not ruptured, ARM was done at 3 cm cervical dilatation. Pre-vaginal examination was done if there was rupture of membranes or once in 2 h in active phase of labor. The pulse rate, blood pressure, temperature, and urine output were recorded. Delivery particulars, duration of each stage of labor, blood loss at the third stage of labor, and baby particulars were recorded. Mother and baby were observed for postnatal complications if any.

Data were analyzed and all the values were expressed as mean ± standard deviation or as percentages. Statistical comparison was performed by Student’s paired and unpaired t-test and Chi-square test.

RESULTS

Age and parity distribution of women included in this study were comparable in both mifepristone and PGE2 gel group. All the mothers in both groups had initial Bishop score of 0-3 before preinduction cervical ripening. Mean increase in Bishop score in mifepristone group is 5 whereas 3.6 in PGE2 gel group. P value for Bishop score at start is 0.864, which is not significant. P value for Bishop score at augmentation is 0.001, which is significant. P value for Bishop score difference is 0.000, which is significant (Figure 1).

In the mifepristone group, among the six primigravida who were not in need of oxytocin augmentation 4 (8%) had vaginal delivery within 24 h of oral mifepristone administration. Shortest drug administration to delivery interval was 12 h and 5 min. Among the 11 multigravida who were not in need of oxytocin augmentation in the mifepristone group, 9 (18%) had vaginal delivery with in 24 h of oral mifepristone, of which 4 (8%) had delivery...
within 10 h. Shortest drug administration to delivery interval was 5 h 54 min.

Whereas in PGE2 gel group, 11 antenatal women that include 8 primigravida and 3 multigravida who were not in need of oxytocin augmentation were those delivered by cesarean section. In other words, in PGE2 gel group, all women who had vaginal delivery were in need of oxytocin augmentation (Figure 2).

Duration of 2nd and 3rd stage of labor was shorter in mifepristone group with statistical significance. Duration of 1st stage was shorter in PGE2 gel group which is not statistically significant. Drug administration to delivery interval was shorter with PGE2 gel group with statistical significance. Statistically significant was shorter duration of 1st and 3rd stage of labor in multigravida in mifepristone group whereas no statistical difference in duration of labor among primigravida and multigravida in PGE2 gel group (Table 1).

Cesarean section rate was higher in PGE2 gel group which was 24% when compared to mifepristone group in which it was 12%. Mean blood loss in mifepristone group was less when compared to PGE2 gel group. In PGE2 gel group 1 (2%), primigravida had atonic PPH - blood loss of 1250 ml which was controlled with uterotonics. Maternal complications were similar in both groups (Table 2).

Neonatal intensive care unit admission was 18% in PGE2 gel as compared to 10% in mifepristone group. In PGE2 gel group, one neonate was admitted for low birthweight. Apgar score at 1 min and 5 min were similar in both groups.

### Table 1: Distribution of duration of labor

<table>
<thead>
<tr>
<th>Duration of labor</th>
<th>Group - 1</th>
<th>Group - 2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of 1st stage (h)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group - 1</td>
<td>6.8867±2.12457</td>
<td>6.8618±1.41495</td>
<td>0.951</td>
</tr>
<tr>
<td>Group - 2</td>
<td>6.8618±1.41495</td>
<td>6.8867±2.12457</td>
<td></td>
</tr>
<tr>
<td>Duration of 2nd stage (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group - 1</td>
<td>22.4222±5.19829</td>
<td>26.9474±6.40501</td>
<td>0.001</td>
</tr>
<tr>
<td>Group - 2</td>
<td>26.9474±6.40501</td>
<td>22.4222±5.19829</td>
<td></td>
</tr>
<tr>
<td>Duration of 3rd stage (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group - 1</td>
<td>4.0659±1.20309</td>
<td>5.4408±1.30596</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Group - 2</td>
<td>5.4408±1.30596</td>
<td>4.0659±1.20309</td>
<td></td>
</tr>
<tr>
<td>Duration of 4th stage (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group - 1</td>
<td>18.7341±10.04693</td>
<td>11.784±3.85583</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Group - 2</td>
<td>11.784±3.85583</td>
<td>18.7341±10.04693</td>
<td></td>
</tr>
</tbody>
</table>

SD: Standard deviation

### Table 2: Distribution of mode of delivery

<table>
<thead>
<tr>
<th>Mode of delivery</th>
<th>Group - 1 (%)</th>
<th>Group - 2 (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primi</td>
<td>Multi</td>
<td></td>
</tr>
<tr>
<td>Labor natural</td>
<td>22 (44)</td>
<td>21 (42)</td>
<td>43 (86)</td>
</tr>
<tr>
<td>Outlet forceps delivery</td>
<td>1 (2)</td>
<td>1 (2)</td>
<td>2 (4)</td>
</tr>
<tr>
<td>LSCS</td>
<td>3 (6)</td>
<td>3 (6)</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Spontaneous expulsion of fetus</td>
<td>1 (2)</td>
<td>1 (2)</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Total</td>
<td>26 (52)</td>
<td>24 (48)</td>
<td>50 (100)</td>
</tr>
</tbody>
</table>

LSCS: Lower segment cesarean section
7 (14%) neonates in each group had Apgar score <7 at 5 min following birth (Figure 3).

**DISCUSSION**

In this study, mifepristone given as 200 mg single dose orally and observation period of 24 h similar to the Wing et al., in which mifepristone was compared with placebo whereas PGE2 gel in this study (Table 3).

In this study, 66% required oxytocin; this was consistent with prior studies. In our study, mean duration of the 1st stage was <8 h and 2nd stage duration was <30 min. These results were consistent with the World Health Organization standards. In this study, 36 (72%) women, 32% primigravida and 40% multigravida, delivered vaginally within 24 h and totally 44 (88%) women, 46% primigravida and 42% multigravida, delivered vaginally within 48 h which was consistent with Wing et al. study (Table 4).

In our study, vaginal delivery rate was 88% (46% primigravida and 42% multigravida) the results were consistent with above-mentioned studies. In this study, the success of induction was vaginal delivery within 48 h. Success rate was 88% which was consistent with 87.5% success rate in Wing et al. study (Table 5).

In our study, success of induction in relation to change to favorable Bishop score of 6 or more was seen in 90% (42% in primigravida and 48% in multigravida) which was consistent with Wing et al. and Frydman et al. study.

In this study, failed induction in terms of cesarean section or vaginal delivery after 48 h of ripening was seen in 12% among which one primigravida underwent cesarean section for failed induction. These results were consistent with Giacalone et al. study and Wing et al. study in which failed induction rate was 9.2%.

**CONCLUSION**

This study reveals that oral mifepristone is very safe and an effective drug for preinduction cervical ripening. It has added advantage of ease of administration, better patient compliance and acceptance, reduced oxytocin requirement, shorter duration of 2nd, 3rd stages of labor, and less blood loss with an overall success rate of 88%. The drug has no untoward side effects on uterine contraction and no major maternal complications. This drug has safe neonatal outcome. This drug is more effective in multigravida when compared to primigravida. Hence, mifepristone offers advantages over PGE2 gel which is currently used for preinduction cervical ripening. Mifepristone is administered orally which is very convenient and antenatal mothers can be ambulant when compared to cumbersome PGE2 gel administration which has to be instilled endocervically with strict asepsis by technically skilled personnel and needs observation in the left lateral position.

**REFERENCES**

5. Wing DA, Michael JF, Daniel RM. Mifepristone for pre induction cervical

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### Table 3: Comparison of dosage schedule

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Dosage schedule</th>
<th>Control</th>
<th>Wait period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing et al.⁵</td>
<td>2002 (180)</td>
<td>200 mg of mifepristone oral dose followed by intravaginal misoprostol 25 micrograms every 4th hourly or IV oxytocin⁵</td>
<td>Placebo</td>
<td>24 h</td>
</tr>
<tr>
<td>Li et al.⁶</td>
<td>1996</td>
<td>150 or 200 mg mifepristone in the 1st 2 or 3 days and on the 4th day misoprostol was added successively in 100-300 mg dosage</td>
<td>-</td>
<td>3 days</td>
</tr>
<tr>
<td>Su et al.⁷</td>
<td>1992 (120)</td>
<td>50 mg mifepristone 12th hourly for 2 days followed by PG or oxytocin</td>
<td>-</td>
<td>48 h</td>
</tr>
<tr>
<td>Frydman et al.⁸</td>
<td>1992</td>
<td>200 mg mifepristone on days 1 and 2 followed by augmentation with PG on day 4</td>
<td>Placebo</td>
<td>4 days</td>
</tr>
<tr>
<td>This study</td>
<td>2010</td>
<td>200 mg mifepristone as a single oral dose</td>
<td>PGE2</td>
<td>24 h</td>
</tr>
</tbody>
</table>

PGE2: Prostaglandin E2

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### Table 4: Comparison of need of augmentation

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Need for augmentation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing et al.⁵</td>
<td>2002</td>
<td>67</td>
</tr>
<tr>
<td>Li et al.⁶</td>
<td>1996</td>
<td>80</td>
</tr>
<tr>
<td>Su et al.⁷</td>
<td>1996</td>
<td>Decreased</td>
</tr>
<tr>
<td>Frydman et al.⁸</td>
<td>1992</td>
<td>Decreased</td>
</tr>
<tr>
<td>This study</td>
<td>2010</td>
<td>66</td>
</tr>
</tbody>
</table>

---

### Table 5: Comparison of incidence of vaginal delivery

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Incidence of vaginal delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing et al.⁵</td>
<td>2002</td>
<td>87.5</td>
</tr>
<tr>
<td>Li et al.⁶</td>
<td>1996</td>
<td>80.88</td>
</tr>
<tr>
<td>Su et al.⁷</td>
<td>1996</td>
<td>22.58 (vs. 4.84% of control group)</td>
</tr>
<tr>
<td>This study</td>
<td>2010</td>
<td>88</td>
</tr>
</tbody>
</table>


Source of Support: Nil, Conflict of Interest: None declared.
Causes and Clinical Profile of Cases of Ocular Trauma Attending a Tertiary Medical Center

Alok Ranjan¹, Md. Nazarul Islam², Mita Saha (Dutta Chowdhury)³

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Abstract

Purpose: Study of demographic and clinical profile of patients with ocular injury in developing countries.

Study Design: This was an observational, descriptive study of cross-sectional design.

Place and Duration of Study: The study was conducted in R.G. Kar Medical College and Hospital, Kolkata, 1 year - June 2013 to May 2014.

Materials and Methods: This study was conducted at the Ophthalmology Department, R.G. Kar Medical College, Kolkata, West Bengal, India. All patients are attending our emergency and outpatient department between March 2014 and February 2015, with a history of ocular trauma, were included in this descriptive observational study with cross sectional in design. All the patients were examined by ophthalmologists of the department. Examination included best corrected visual acuity and detailed anterior and posterior segment evaluation.

Results: Distribution by the age of ocular injury cases showed gradual decline with age with maximum number of patients in 21-40 years of age group. Temporal spectrum showed a bimodal peak in March and November. The majority were males 960 (74.7%) cases, work-related trauma accounted in 541 (42.1%) patients. Sharp pointed object related injuries were the most common and observed in 494 (38.4%) cases. Corneal complications were mostly noted. However, visual loss, i.e., visual acuity <6/18 was found in 51 (3.9%) cases. Unsatisfactory health care in workplaces and poor access to ocular emergency care was noted.

Conclusion: Primary eye care services need to be strengthened.

Key words: Ocular trauma, Primary eye care, Sharp pointed object, Work place trauma

INTRODUCTION

Ocular injury is a major cause of treatable visual impairment and blindness.¹ However, up to 5% of all blindness occurs due to direct result of trauma.² According to an estimate under the WHO program for the prevention of blindness, the incidence of open globe injuries in the world is about 2 lakh cases per year which were largely preventable. Ocular trauma has a major socioeconomic and psychological impact on the patients and their families. The eye injuries both in adults and children are mainly physical assault or accident. Males are more frequently injured than females because males are more active in indoor and outdoor activities.³ Children are more commonly injured than adults due to their curiosity and underdeveloped motor skills. Nearly 90% eye injuries can be prevented by relatively simple measures.³ However, the use of ocular - protective devices in India is very low.⁴ Various studies on ocular trauma in developed⁵-¹¹ and developing countries have been conducted. There is a lack of data regarding pattern of eye injuries in developing countries.¹² This necessitated to conduct this study. The patients which need immediate hospitalization ranges from 4.9 to 89 per 100,000.¹³ Estimation of clinical profile and causes of injury can help us to plan the preventive measures.
MATERIALS AND METHODS

The study was conducted in the Ophthalmology Department of a tertiary eye care hospital in India between June 2013 and May 2015. This was an observational, descriptive study of cross-sectional design. Patients attending the hospital outpatient department or emergency with a history of ocular trauma to one or both eyes or foreign body in either eye, within 15 days of occurrence were eligible for this study. Necessary approval from the Ethics Committee of the hospital was taken. Written informed consent was taken from each patient on a printed form before any examination. Detailed history was taken regarding age, sex, and residence, time of occurrence of injury, place, and type of injury inflicted. All patients underwent detailed anterior and posterior segment evaluation using slit lamp and direct and indirect ophthalmoscope, respectively. The intraocular pressure was measured (when indicated). Orbit was examined for any fracture that could be noted on palpation. Data were recorded on a pretested format and were analyzed in EPIINFO 6.04 software. Statistical calculations were done using Epitable calculator. Frequency and percentage were calculated using bar diagram and pie chart for data presentation.

RESULTS

In this study, 1285 patients with injury either in one or both eyes were clinically examined between March 2014 and February 2015. Among 1285 cases, total number of eyes affected was found to be 1435.

Age
Out of 1285 cases sustaining trauma, 423 (32.91%) were in 0-20 years, 569 (44.28%) cases in 21-40 years, 249 (19.37%), 40 (3.11%) in 61-80 years, and 4 (0.31%) cases over age of 80 years, respectively. Maximum numbers of patients (569 = 44.3%) were seen in 21-40 years age group (Figure 1). The mean age of the patients was 29.81 ± 16.57).

Sex
There was male preponderance in patients sustaining ocular trauma and it was 1118 (87.00%) in comparison to female which was 167 (12.99%). The male and female proportion between 0-20 years were 367 (86.76%) and 56 (13.23%), 21-40 years 498 (87.76%) and 77 (13.53%), 41-60 years 221 (88.75%) and 28 (11.25%), 61-80 years 35 (87.50%) and 5 (14.28%), and over the age of 80 years 3 (75%) and 1 (25%), respectively (Table 1). A trend of male preponderance in all age group was observed.

Temporal Spectrum
Monthly-wise distribution of ocular trauma showed two spikes in the months of March and November. There was total cases reported in the month of March and November was 576 (44.82%) and 653 (50.81%), respectively, and 66 (5.13%) cases were in rest of months.

Residence
In this study, 860 (66.9%) people attended from rural areas and 425 (33.1%) people from urban areas.

In majority of cases, there was occupation-related injury and was accounted in 539 (41.94%) cases. Injury to eye sustained in road traffic accident was noted in 346 (26.92%). Apart from this, injury sustained while playing in school and home was also observed in 179 (13.92%) cases. In few cases, the exact location of occurrence of injuries could not be remembered by the patients at the time of reporting.

Type of Injury
Injury by sharp pointed object occurred in 494 (38.4%) patients. Blunt trauma occurred in 275 (21.4%) patients of whom there were 145 (11.3%) cases of fist blow, 130 (10.1%) cases of hit against solid object and cracker and stove burst. Extraocular foreign bodies were detected in 155 (12.1%) patients; however, only 3 (0.2%) cases of intraocular foreign body (IOFB) were seen in this study. Corrosive burn by acids and alkalis were found in 59 (4.6%) patients. Injury by coloring agent found in 52 (4.1%) patients. In addition, there were 110 (8.5%), 16 (1.3%), 33 (2.6%), and 24 (1.9%) cases of oil burn, arc welding injuries, insect bite and injury by vegetable matter, respectively (Figure 2).

Ocular Structures Involved
Injuries were noted in one eye in 1135 patients and in both eye in 150 patients making number of injured eyes.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of patients</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>423</td>
<td>367 (86.76)</td>
<td>56 (13.23)</td>
</tr>
<tr>
<td>21-40</td>
<td>569</td>
<td>498 (87.52)</td>
<td>77 (13.53)</td>
</tr>
<tr>
<td>41-60</td>
<td>249</td>
<td>221 (88.75)</td>
<td>28 (11.24)</td>
</tr>
<tr>
<td>61-80</td>
<td>40</td>
<td>35 (87.50)</td>
<td>5 (14.28)</td>
</tr>
<tr>
<td>&gt;80</td>
<td>4</td>
<td>3 (75)</td>
<td>1 (25)</td>
</tr>
<tr>
<td>Total</td>
<td>1285</td>
<td>1118 (87.00)</td>
<td>167 (12.99)</td>
</tr>
</tbody>
</table>

Figure 1: Number of patients in different age group

Table 1: Distribution of patients in different age group
1435 in 1285 patients. Again a single patient might have injuries at multiple structures of the eye. Corneal injuries accounted for the highest number of cases - 1049, of which there were epithelial abrasions in 618 cases and superficial foreign body in 49 cases. Lid injuries of all types accounted for 732 cases, 40 cases of globe rupture, 693 cases of subconjunctival hemorrhage, 52 cases of traumatic iridocyclitis, and 22 cases of lens subluxation or dislocation. In posterior segment, a good number of eyes could not be examined adequately. As the patients of this study were examined once only at first presentation, only a few injuries could be identified. Vitreous hemorrhage (10) and orbital fracture (19) were important ones.

Visual Loss
A total of 558 (43.4%) of the patients suffered no visual loss at presentation, 324 (25.2%) had a visual loss of one line, 158 (12.3%) patients had a visual loss of two lines, 132 (10.3%) patients had a visual loss of three lines, 62 (4.9%) patients, and 51 (3.9%) patients had visual loss of 5 and 7 lines, respectively.

DISCUSSION
In this study, it was evident that a huge number of patients regularly attend a tertiary care government hospital for treatment of eye injuries.

The most involved age group was 21-40 (44.3%) with mean age of 29.81 ± 16.57. The age wise distribution of ocular trauma cases showed gradual decline in number with increasing age.

In most studies, the mean age varied between twenties and thirties.14-16 The risk-taking behavior, the lack of experience and knowledge of dangers in this age group were responsible in addition to nonavailability of facility of first aid. However, the number of patients presenting with trauma showed a linear decline with age. This can be explained by the fact that, during festival season, there is active involvement of younger population in making fun and enjoyment in outdoor activities with fireworks and another means, while older peoples prefer to stay in indoor. The bimodal pattern seen in various western studies did not show up here. This was probably because of the low number of cases in the age group of more than 70 years, corresponding to India’s life expectancy.

The male predominance of ocular trauma continued to prevail in this study. A male preponderance was reported by almost all authors working on ocular injuries.15,17-19 This is more relevant in Indian setting, where the majority of the population is rural and a considerable number of women are home makers with limited travel, work and sports. The higher incidence in males may be related to the injuries associated with assault, road traffic accidents, work, and sports.

Incidentally, the monthly distribution of ocular trauma corresponded to the festivals Holi (Doljatra) and Diwali. Holi is usually celebrated in March and Diwali in October/November. A further analysis on a daily basis over this period showed a higher incidence of trauma closer to the festival periods. Seasonal variation observed in this study will help in planning and increasing health effort in health education during these seasons.

The majority of the patients were from rural areas (66.9%) and few from urban areas (33.1%).

The hospital where the study was undertaken was semi-urban. Hence, findings as to nature, types and causes of injuries in this study differed on many situations in studies reported exclusively from rural population10 or developed countries.11,17

The other epidemiological studies on ocular trauma have shown work related trauma to predominate.20 In our study, work-related injuries were found to be 42.1%.

Injury by sharp objects (38.4%) can be compared to that reported as 42% and 36.4%, respectively, in the Singapore and Indian eye study.16,21 A large number of sharp object or stick injury was not unexpected in an agricultural society where the predominant occupation is a daily wage laborer in the agricultural field. Furthermore, firewood was the fuel used for cooking in rural areas and injuries occurred when breaking sticks and cutting wood for fire. Blunt trauma occurred in 275 (21.4%) patients, which corroborate with the findings of a population-based study in rural South India19 and other studies.17 Extraocular foreign bodies were detected in 155 (12.1%) cases; this is in contrast to 4.5% patients in Singapore study.11 Very few cases of IOFB 3 (0.23%) presented to our hospital. This was usually associated with industrial

Figure 2: Mode of injury
trauma, construction works, lathe machine works, and stone cutters. This may be due to the majority of the patients from rural areas, and such types of injuries are more common in urban areas like industrialized urban area in Singapore where nearly 15% of the injuries were due to intraocular foreign bodies or an Army General Hospital in China. Injury due to corrosive acids and alkalis in this study (4.6%) differed widely from Singapore eye study. This might be due to increase in the growth of industries in Singapore which led to more corrosive injuries than in this developing country. Injury by coloring agent occurred in Holi season. Injury by hot oil was higher in females. Insect bites were marked in both males and females. Caterpillar hair induced corneal injury was very common as caterpillars are very common in rural setting in this part of the country.

The patients were examined and data recorded only once and at first presentation. Further, follow-up and management were not in the scope of this study. Hence, even if any perforating injury was there, it could not be confirmed during the first examination.

According to the standardized classification of ocular trauma, all the ocular injuries presented in this study were categorized as shown in Table 2.

On the first presentation, blindness in one eye (<6/60) was noted in 51 (3.9%) eyes. This should not be concluded as the ultimate effect of trauma as there was no follow-up done. Trauma in both eyes was less common compared to trauma in one eye, similar to another study.

The most significant finding was that majority of patients with foreign body did not know that they had foreign body in the eye and was diagnosed during eye examination. They reported for symptoms only. Another finding was that the maximum number of patients did not receive any first-aid before attending ophthalmologists of this tertiary care hospital. This indicates lack of consciousness or nonavailability of primary or secondary eye care services in this area. Corneal complications which were very common can only be reduced by improving primary eye care and eye health education.

The patients were examined only once at the first presentation. The number of cases and the various types of injuries were noted, and the different types of data collected during the study, would help in getting an impression about the types, causation, and the relationship of different social status on injuries. These findings may be important for recommending future plans for managing injuries and also preventing blindness due to trauma. The most important is to conduct a well-designed study on this most important issue.

### Table 2: Different ocular injuries among affected eyes (n=1435)

<table>
<thead>
<tr>
<th>Status of globe</th>
<th>Type of injury</th>
<th>Affected eyes number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed globe injuries</td>
<td>Contusion</td>
<td>901 (66.64)</td>
</tr>
<tr>
<td></td>
<td>Lamellar laceration</td>
<td>447 (33.16)</td>
</tr>
<tr>
<td>Open globe injuries</td>
<td>Penetrating</td>
<td>44 (50.57)</td>
</tr>
<tr>
<td></td>
<td>IOFB</td>
<td>3 (3.44)</td>
</tr>
<tr>
<td></td>
<td>Perforation</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td></td>
<td>Rupture</td>
<td>40 (45.57)</td>
</tr>
</tbody>
</table>

IOFB: Intraocular foreign body

### REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study of Levobupivacaine and Levobupivacaine with Tramadol in Pediatric Caudal Epidural Block

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Abstract

Introduction: Caudal block is the regional anesthetic technique that is used most frequently in pediatric surgery, and bupivacaine and levobupivacaine are widely utilized in this technique. Opioid drugs have been added to local anesthetic solutions to prolong the duration of analgesia, but ideal combination was not found.

Aim: The aim is to study the post-operative analgesic effects and other effects of tramadol when added to caudal levobupivacaine as an adjunct in children undergoing lower abdominal surgeries.

Materials and Methods: ASA I and II patients between 2 and 6 years of age undergoing lower abdominal surgeries were included in the study. Group LT (n = 30) received caudal 0.25% levobupivacaine 1 ml/kg with tramadol 2 mg/kg making the volume to 0.5 ml and Group L (n = 30) received caudal 0.25% levobupivacaine 1 ml/kg + 0.5 ml normal saline.

Results: The duration of post-operative analgesia recorded a mean of 5.5 ± 1.05 h in group L compared with 13.5 ± 2.3 h in Group LT, with a P < 0.0001. The dosage of paracetamol consumed was greater in the L group and is statistically significant with a P < 0.0001. The difference of mean sedation score between both groups was statistically insignificant (P > 0.05). No episodes of clinically significant post-operative complications such as post-operative nausea and vomiting, respiratory depression, urinary retention, pruritus, hypotension, and bradycardia were observed.

Conclusion: Levobupivacaine with tramadol provided effective post-operative analgesia with minimal side effects.

Key words: Anesthesia, Caudal, Levobupivacaine, Tramadol

INTRODUCTION

The quest for searching newer and safer anesthetic agents has always been one of the primary needs in anesthesia practice. Ease of performance and reliability makes caudal block the most routinely performed block in pediatrics. Administration of caudal bupivacaine is a widely used regional anesthetic technique for both intra- and post-operative analgesia in lower limb, anoperineal, penoscrotal, and abdominal surgical procedures in pediatrics.¹ Unintentional intravascular injection of bupivacaine during caudal block placement may cause life-threatening cardiovascular and central nervous system complications.² There have been reports of death attributable to bupivacaine-induced cardiotoxicity in adults after accidental intravenous injection.³ Even an epidural test, dose containing epinephrine does not reliably produce hemodynamic responses in children during inhalation anesthesia.⁴ In this study, we have chosen levobupivacaine. Levobupivacaine in comparison to bupivacaine has a wider margin of safety, less motor blockade, less cardiovascular/neurological toxicity, and similar duration of analgesia. It can be safely used for regional anesthesia and analgesia in the ambulatory setting in pediatrics a newer drug with less toxicity profile instead of bupivacaine.⁵

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To overcome this problem as well as to increase the duration of analgesia, combining local anesthetic agents with other drugs as adrenaline, clonidine, ketamine, or various opioids have met with varying degrees of success. We used tramadol in this study as the adjuvant owing to its lesser respiratory depressant action compared to other opioids and its significance in prolonging post-operative analgesia as reported from other studies.

**Aim**

The aim is to study the post-operative analgesic effects and other effects of tramadol when added to caudal levobupivacaine as an adjunct in children undergoing lower abdominal surgeries.

**MATERIALS AND METHODS**

The prospective randomized comparative study was conducted in the Department of Anesthesia at Tirunelveli Medical College Hospital. ASA I and II patients between 2 and 6 years of age undergoing lower abdominal surgeries were included in the study. Exclusion criteria: Suspected coagulopathy, infection at the site of caudal block, history of developmental delay, neurological diseases, skeletal deformities, and allergy to local anesthetics. Group LT (n = 30) received caudal 0.25% levobupivacaine 1 ml/kg with tramadol 2 mg/kg making the volume to 0.5 ml and group L (n = 30) received caudal 0.25% levobupivacaine 1 ml/kg + 0.5 ml normal saline. All the patients were premedicated with injection atropine 0.02 mg/kg i.m. 45 min before anesthesia. Induction of anesthesia was achieved with 50% N₂O and 8% sevoflurane in oxygen in spontaneous ventilation. Appropriate size laryngeal mask airway (LMA) was inserted. After the insertion of LMA, sevoflurane concentration was reduced to 3% in 50% nitrous oxide, patients were left in spontaneous ventilation, and a caudal block was performed in all patients depending on the group. Hemodynamic parameters were maintained 30% below the baseline by adjusting the amount of sevoflurane that was inhaled. During the intraoperative period, narcotics, analgesics, or sedatives were not added. Standard monitors were utilized during the procedure. Recordings of heart rate, mean airway pressure, and SpO₂ were taken before the procedure and every 5 min till the procedure ended. During the procedure, recordings of any hypotension requiring crystalloid bolus, use of atropine for bradycardia, and maintenance requirement of sevoflurane were done. The occurrence of intraoperative hypotension requiring a fluid bolus, bradycardia requiring atropine, and the maximum maintenance concentration of sevoflurane was recorded. Pediatric observational Face, Legs, Activity, Cry, Consolability scale (FLACC) scale was used with its 0-10 score range. Each patient’s pain intensity was determined at the end of surgery and then every 4 h for 24 h following the surgery. When FLACC score was 4 or more, syrup paracetamol 15 mg/kg was administered. The duration of analgesia (from the time of caudal injection to the time at which FLACC score, 4 or more) was also recorded. Sedation score was assessed using Ramsay’s sedation scale. Complications such as post-operative nausea and vomiting (PONV), respiratory depression, hypotension, and bradycardia were also noted.

**RESULTS**

In this study, we encountered eight failed caudal blocks. Those cases were eliminated from the study. Age, weight of the children, and duration of surgery between both the groups were comparable and were not statistically significant (P > 0.05). In the LT group, 66.6% were male and the remaining 33.3% were females, compared to the L group which had 60% males and 40% females. Both groups were comparable with no statistical difference. The mean weight of the LT group was 13.100 ± 3.889 kg and L group was 12.907 ± 3.549. The difference of weight between the two groups was not statistically significant (P > 0.05). The type of surgeries between the both groups was also comparable but not statistically significant (Table 1). The pre-operative hemodynamic changes between the groups were comparable and were not statistically significant.

The end of surgery hemodynamic changes between the groups was comparable and was not statistically significant. The intraoperative hemodynamic changes between the groups were comparable and were not statistically significant.

The mean duration of surgery of L group was 35.667 ± 7.5 min and LT group was 37.6 ± 5.3 min. The difference between the means was not statistically significant (P > 0.05) (Table 2). The emergence from surgery is comparable in both groups.

<table>
<thead>
<tr>
<th>Table 1: Comparison of procedure based on group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of surgery</td>
</tr>
<tr>
<td>Hemiorrhaphy</td>
</tr>
<tr>
<td>Hydrocele</td>
</tr>
<tr>
<td>Circumcision</td>
</tr>
<tr>
<td>Orchiopexy</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Comparison of the duration of surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
</tr>
<tr>
<td>L group</td>
</tr>
<tr>
<td>LT group</td>
</tr>
</tbody>
</table>

SD: Standard deviation
The duration of post-operative analgesia recorded a mean of $5.5 \pm 1.05$ h in group L compared with $13.5 \pm 2.3$ h in Groups LT, with a $P < 0.0001$ (Table 3).

The dosage of paracetamol consumed was greater in the L group and is statistically significant with a $P < 0.0001$ (Table 4).

The difference of mean sedation score between both groups was statistically insignificant ($P > 0.05$) (Table 5).

There was a significant difference between the groups in the FLACC scores measured at 4th and 6th h in the post-operative period. Group L patients achieved significantly higher FLACC score in comparison to group LT, where 15 children reached a FLACC score of 4, at 6th h compared with 0 patient in group LT. Whereas, in group LT, children had FLACC score 4, only at 16th h of post-operative period (Table 6). No episodes of clinically significant post-operative complications such as PONV, respiratory depression, urinary retention, pruritus, hypotension, and Bradycardia were observed.

**DISCUSSION**

In this study, the caudal block was performed in 60 children, 24-72 months of age, to compare the effects of levobupivacaine alone with a low dose combination of 0.25% levobupivacaine with 2 mg/kg tramadol for lower abdominal surgeries.

Yildiz *et al.* compared the analgesic efficacy and duration post-operatively in children undergoing inguinal hernia repair following caudal block with levobupivacaine 0.125% or caudal tramadol 1.5 mg/kg and a mixture of both. They noticed no hemodynamic variations during the intraoperative period following surgical incision. Duration of analgesia was significantly prolonged in group LT than in group L and group T (9.1 ± 2.6 h vs. 5.4 ± 3.1 h and 4.1 ± 3.1 h, respectively) ($P < 0.01$). There were no significant differences between the group L and group T for the duration of analgesia ($P > 0.05$). There was no significance among the groups in the number of patients requiring analgesia following surgery ($P = 0.7$). In this study, the duration of post-operative analgesia was significantly longer in the LT group (813.6 ± 138). This may be due to the higher concentration of levobupivacaine (0.25%) used in this study.

Prakash *et al.* evaluated the efficacy of analgesia following three doses of tramadol, given along with caudal bupivacaine, in providing post-operative pain relief for pediatric inguinal herniotomy. In their studies, when they used 2 mg/kg of tramadol with caudal bupivacaine 0.25% (0.75 ml/kg) in pediatric inguinal surgeries, they got a mean duration of post-operative analgesia of (mean [standard deviation] 12 (0.9) h). In this study, we used tramadol 2 mg/kg with 0.25% 1 ml/kg and we observed a post-operative analgesia of 13.5 ± 2.3 h. This increased duration of analgesia may be due to the higher volume of 1 ml/kg of levobupivacaine that we used in our study. However, the post-operative sedation scores in our study were insignificant and comparable to the above study. Furthermore, like the above study, the time to 1st void was significantly prolonged in the tramadol group. Only one study reported that the addition of tramadol did not significantly prolong the action of caudal bupivacaine.6

Engelman and Marsala9 suggested that there could be a synergistic effect between the local anesthetics and the additives, such as tramadol, rather than simply an additive

| Table 3: Comparison of the duration of analgesia |
|----------------|----------------|-------------|
| Groups          | Mean±SD       | $P$ value  |
| L group         | 5.53±1.050    | <0.0001    |
| LT group        | 13.56±2.388   |             |

SD: Standard deviation

| Table 4: Comparison of the number of doses of paracetamol taken |
|----------------|----------------|-------------|
| Groups          | Mean±SD       | $P$ value  |
| L group         | 2.86±0.571    | <0.0001    |
| LT group        | 1.23±0.430    |             |

| Table 5: Comparison of sedation score |
|----------------|----------------|-------------|
| Hours           | Mean±SD       | $P$ value  |
| L group LT group |
| 2               | 2±0           | 1.000      |
| 3               | 1.60±0.498    | 0.599      |
| 4               | 1±0           | 1.000      |
| 5               | 1±0           | 1.000      |
| 6               | 1±0           | 1.000      |

SD: Standard deviation

| Table 6: Comparison of FLACC score |
|----------------|----------------|-------------|
| Hours           | Mean±SD       |              |
| L group LT group |
| 2               | 0.46±0.629    | 0±0         |
| 4               | 2.43±0.817    | 0.36±0.615  |
| 6               | 3.61±0.496    | 1.03±0.850  |
| 8               | 4.00±0        | 2.00±0.910  |
| 12              | 2±0           | 2.82±0.945  |
| 16 h            | 0±0           | 3.90±0.308  |
| 20 h            | 0±0           | 4.00±0.000  |

FLACC: Face, Legs, Activity, Cry, Consolability scale
effect, as the higher the dose of local anesthetics, the greater the additional anesthetic effect. In the literature, there are studies in rats exploring a synergistic interaction between intrathecal clonidine and lidocaine.10

In short, the results of this study were comparable with most of the previous studies. Caudal administration of tramadol to levobupivacaine seems to produce a dose related but definite increase in post-operative analgesia. There was no difference in post-operative sedation between the groups as evident by the time to spontaneous eye opening and sedation scores. Its still doubt whether the action of tramadol is due to delayed systemic absorption of the drug or due to a direct action at the spinal level, owing to the fact that it is one of the few drugs that have the same dose i.v and epidurally. In a study conducted in rats, it was found that tramadol depresses the spinal nociceptive responses in a similar way to morphine.11

CONCLUSION

Low-dose combination of 0.25% levobupivacaine and caudal tramadol 2 mg/kg body weight injected caudally for lower abdominal surgeries in young children had an additive effect and provided effective post-operative analgesia with minimal side effects. The duration of post-operative analgesia was significantly prolonged as compared to 0.25% levobupivacaine.

REFERENCES


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Pattern of Refractive Errors and Disturbances of Binocular Vision in Medical College Students

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²Junior Resident, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab, India, ³Professor and Head, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab, India

Abstract

Introduction: The present study is an attempt to work out the pattern of refractive errors and disturbances of binocular vision in 1265 medical college students, who are subjected to visual stress of higher education.

Material and Methods: Nine successive batches seeking admission to 1st year MBBS at Government Medical College, Patiala, Punjab, India from 2007 to 2016 were subjected to vision testing on distant vision testing snellen’s chart, retinoscopic examination, Maddox rod test, and range of fusion on synoptophore.

Results: 175 (34.6%) students were found to be myopic and only 27 students (5.3%) were hypermetropic with or without astigmatism. 51 female students (33.7%) were myopic as compared to 39 male students (25.7%). Astigmatism of 0.6 D or more with or without spherical errors was exhibited by 47 students (9.3%). Exophoria on Maddox rod was found to be more common than esophoria and was maximum in the range of 0-4 prism dioptres, i.e., 640 students (50.6%). On synoptophore, in 775 students (61.34%) adduction fusional range was between 0 and +12 indicating convergence insufficiency.

Conclusion: The study shows that myopia and convergence insufficiency are common in medical college students.

Key words: Binocular vision, Medical college students, Refractive errors

INTRODUCTION

Estimates of refractive errors and other visual disturbances in specialized populations - children or different ethnic groups has naturally excited a great deal of interest and the first such statistical study by Stromberg indicated that 98% of all refractions fell between +4 D and −4 D.¹ It was conducted on recruits for Swedish Armed Forces. Among Scottish children, Thomson found 18.8% myopia.² Jackson among 1482 patients between 20 and 30 years of age found 13.7% emmetropia, 66.7% hypermetropia, and 19.6% myopia.³ A considerably greater incidence of myopia occurs in Japan⁴ and also in China where Li (1920) found 53% of Chinese students having myopia. However, in India, most of the studies relating to refractive errors are derived from material seen in clinics and are, therefore, biased in that they carry a significant number of refractive errors for which relief may have been sought. Furthermore, no comparable survey is available in the specialized group of medical students who are subjected to visual stress of higher education as in our case. Hence, the need for this studies into the pattern of refractive errors and disturbances of binocular vision in medical college students.

MATERIALS AND METHODS

A total of 675 female and 590 male medical students in nine successive batches, i.e., from 2007 to 2016 seeking admission to 1st year MBBS at Government Medical College, Patiala, Punjab, India were screened. Every year, the batch of students was subjected to routine ocular examination such as vision testing on a distant vision testing snellen’s chart. Each student was further subjected to retinoscopic examination. The mean spherical refraction (sphere +1/2 cylinder) was used for the mainly spherical errors and the ocular refraction in the least ametropic meridian for eyes with astigmatism of >0.5 D while tabulating the results. In anisometropic cases, the more ametropic eye was included in the present...
study. The distribution of refractive errors thus obtained was tabulated in the given Table 1. In addition to it, tests relating to binocular vision such as Maddox rod test and range of fusion on synoptophore were also carried out.

RESULTS AND DISCUSSION

1. Table 1 shows distribution of refractive errors in 1265 medical students, i.e., 590 male and 675 female student.
2. In our study of 1265 students, 759 medical students (60%) are thus found to have no refractive error by any practical definition, i.e., they fall in the refractive group of 0.0 to +0.9 D and the rest 506 students (40%) have definitive refractive errors.
3. These 506 students with refractive errors consist of following categories:
   • Simple myopia, 152 students (30%)
   • Myopic astigmatism, 23 students (4.6%)
   • Total myopia, 175 students (34.6%)
   • Simple hypermetropia, 7 cases (1.3%)
   • Hypermetropic astigmatism, 20 cases (4%)
   • Total hypermetropia, 27 cases (5.3%)
   • Our figures are not quite different from those of Derby who found 35% of Myopia, 15% hypermetropia, and 49% emmetropia among Boston students.5
4. 51 female students (33.7%) are myopic as compared to 39 male students (25.7%) in the present study.
5. Astigmatism of 0.6 D or more with or without spherical errors is exhibited by 47 students (9.3%). Estimates of frequency of significant astigmatism vary considerably with the starting point arbitrarily taken, and we took it as 0.6 D. In literature, the different estimates vary from Mogge6 10.56% to Leibowicz7 48.1%. Mixed astigmatism was nil in our study. Three cases (0.6%) was having astigmatism of 0.6 D or more without any spherical error. 44 cases (8.6%) were having astigmatism of 0.6 D or more associated with spherical errors.
6. The ratio of myopia to hypermetropia comes out to be 6.5:1 in our study and the maximum number of myopes was in the range of −0.25 D to −3.0 D.
7. Exophoria on Maddox rod was found to be more common than esophoria was maximum in the range of 0-4 prism dioptres, i.e., in 640 cases (50.67%).
8. On synoptophore, in 775 students (61.34%) adduction fusional range was between +0 and +12 indicating convergence insufficiency.

The study, therefore, shows that myopia and convergence insufficiency are more common in medical college students. More studies are, however, needed to further establish the same because conducting statistical tests on data with the comparatively lesser number of cases requires considerable caution to avoid overinterpretation of the results.

REFERENCES


Table 1: Distribution of refractive errors

<table>
<thead>
<tr>
<th>Ocular refraction (D)</th>
<th>Mainly spherical errors</th>
<th>Astigmatism of 0.6 D or more with or without spherical errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male students</td>
<td>Female students</td>
</tr>
<tr>
<td>+3 and above</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>+2 to +2.9</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>+1 to +1.9</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>0.0 to +0.9</td>
<td>372</td>
<td>387</td>
</tr>
<tr>
<td>−0.1 to −1.0</td>
<td>51</td>
<td>76</td>
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<tr>
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<td>−6.1 and above</td>
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<tr>
<td>Total</td>
<td>531</td>
<td>624</td>
</tr>
</tbody>
</table>
Bacterial Agents and their Antibiotic Resistance Pattern in Neonatal Blood Cultures - A Hospital Based Study

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Abstract

Introduction: Bacterial infections are an important cause of neonatal mortality and morbidity worldwide. Despite advances in neonatal care, antibiotic resistance among common pathogens and the emergence of multidrug-resistant organism continues to be a challenge in the neonatal intensive care units (NICU) today.

Methods: This retrospective hospital based study was conducted over a period of 2 years. We analyzed the results of neonatal blood cultures, their bacteriological profile and the antibiotic resistance pattern.

Results: Out of 1084 neonates screened for sepsis there were 241 (22.23%) positive blood cultures. After excluding coagulase-negative Staphylococcus and Flavobacterium which were suspected to be skin contaminants and also fungi, we analyzed 52 cases of bacterial growth. The predominant growth was Gram-positive organisms (51.92%), of which Staphylococcus aureus and Enterococcus were the predominant isolates. The Gram-negative organism constituted 48.08%, of which Acinetobacter (19.23%) was the most common followed by coliforms (13.46%). The Gram-positive organisms had high resistance to penicillin and ampicillin but were highly sensitive to vancomycin, linezolid, and netilmicin. The Gram-negative group showed high resistance to ampicillin and quinolones and high susceptibility to netilmicin, amikacin, and meropenem.

Conclusion: Periodic surveillance of the bacterial agents and understanding their antibiotic resistance pattern will definitely help in formulating rational antibiotic practices in the NICU.

Key words: Antibiotic resistance, Bacterial agents, Blood cultures, Gram-negative organism, Neonatal sepsis

INTRODUCTION

Neonatal sepsis is a clinical syndrome of bacteremia with systemic signs and symptoms of infection accompanied by positive blood culture in the first 28 days of life.¹ Despite advances in Newborn care neonatal sepsis is still a leading cause of morbidity and mortality, especially in low birth weight and preterm babies.²³ Neonatal septicemia can be divided into early-onset sepsis (EOS) and late-onset sepsis (LOS) depending on the age of presentation. The usual organism and the method of transmission are different in the two groups. EOS (first 72 h of birth) is due to vertical transmission during labor whereas LOS (after 72 h) is due to vertical, horizontal, or nosocomial infection. The incidence and organisms causing neonatal septicemia varies geographically, and also over time.⁴ Group B Streptococci, Escherichia coli, and Listeria monocytogenes predominate in developed countries whereas Staphylococci and Gram-negative bacilli are much more common in developing countries.⁵ Although morbidity and mortality due to neonatal sepsis have decreased over recent years, studies report widespread drug resistance to the commonly used antibiotics.⁶ Knowledge of the common organisms and their antibiotic resistance will help in early initiation of appropriate therapy consistent with successful treatment and improvement in outcome.
This study was conducted to determine the common bacterial pathogens, and their antibiotic resistance pattern from blood cultures of neonates admitted for sepsis at neonatal intensive care unit (NICU), Government Medical College, Ernakulam, Kerala.

**MATERIALS AND METHODS**

This is a descriptive study conducted in the NICU of Government Medical College Ernakulam over a period of 2 years (January 2014 - December 2015). We retrospectively evaluated the case records of babies whose blood cultures were taken as part of screening for both early and late onset neonatal sepsis during the study period.

Blood samples collected from babies at risk for sepsis on the basis of maternal fever, maternal urinary tract infection, prolonged rupture of membranes more than 24 h, foul smelling liquor, or babies with symptoms of lethargy, poor feeding, tachypnea, abdominal distention, feed intolerance, tachycardia, hypothermia, apnea, and seizures suggestive of sepsis were included in the study. Neonates with gross congenital anomalies and those who received antibiotics before taking blood culture were excluded from the study.

Blood cultures were drawn under strict aseptic precaution before starting antibiotics. 2 ml of blood was inoculated in 20 ml of brain heart infusion broth. This was further incubated for the next 7 days at 37°C. Subcultures were done on blood agar and MacConkey’s agar after assessing whether the broth was clear or turbid. If it was turbid, then it was subcultured immediately and if it remains clear, sub cultured after 48 h. If there is no growth, further incubated for next 7 days and sub cultured on the 7th day. If there was no bacterial growth after 7 days of incubation, the culture was reported to be negative. If growth was present, organisms were identified on the basis of colony morphology and standard biochemical tests as per standard lab protocol.

The sensitivity of bacteria to different antibiotics including ampicillin, amikacin, gentamicin, cefalotin, levofoxacin, meropenem, vancomycin, and clindamycin was investigated according to the standard disk diffusion (Kirby-Bauer) method recommended by Clinical and Laboratory Standards Institute. The demographic data, blood culture reports, bacterial isolates and their antibiotic resistance pattern were obtained from the unit register and neonatal case records. Data were analyzed using Statistical Package for Social Sciences version 16 software.

**RESULTS**

There were 241 (22.23%) positive blood cultures (Table 1) out of 1084 neonates screened for neonatal sepsis. Growth of Coagulase-negative *Staphylococci* (184 cases), other possible skin contaminants which included *Flavobacterium* (3 cases) and fungi (2 cases) were excluded. The remaining 52 cases of neonatal sepsis with bacterial growth were evaluated further for antibiotic resistance pattern (Table 2).

Out of 1084 neonates included in the study, male (628) to female (456) ratio was 1.38:1 and term (604) to preterm (480) ratio was 1.26:1.

The predominant growth was Gram-positive organisms (51.92%), of which *Staphylococcus aureus* and *Enterococcus* (15.38%) were the predominant isolates followed by *Corynebacterium* (11.54%) and *Streptococcus viridans* (9.61%).

Of the Gram-negative group, *Acinetobacter* (19.23%) was the most common followed by coliforms (13.46%). The other Gram-negative isolates included *Pseudomonas* (7.69%), *Klebsiella* (5.77%), and *Neisseria* (1.92%).

In the Gram-positive group, complete sensitivity was seen to linezolid, netilmicin and teicoplanin (100%) followed by vancomycin (93.33%) and gentamicin (56.52%) while complete resistance was observed to penicillin and ampicillin. *S. aureus* showed 100% resistance to penicillin and 100% sensitivity to netilmicin while *Enterococci* showed 100% resistance to cephalosporins and ampicillin. Complete susceptibility to linezolid was seen in both organisms (Figure 1).

In the Gram-negative group, high resistance was noted to ampicillin (95%) followed by oxacillin (76.19%) and piperacillin (71.43%). High sensitivity was noted to meropenem (88.24%) followed by netilmicin (77.78%). *Acinetobacter* which was the predominant isolate showed high sensitivity to gentamicin (80%) followed by

<table>
<thead>
<tr>
<th>Table 1: Microbiological profile of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood culture</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Total samples</td>
</tr>
<tr>
<td>Positive culture</td>
</tr>
<tr>
<td>CoNS</td>
</tr>
<tr>
<td>Bacterial growth excluding CoNS</td>
</tr>
<tr>
<td>Acinetobacter</td>
</tr>
<tr>
<td>Coliform</td>
</tr>
<tr>
<td>Corynebacterium</td>
</tr>
<tr>
<td>Enterococcus (Strep D)</td>
</tr>
<tr>
<td>Streptococcal viridans</td>
</tr>
<tr>
<td>Klebsiella</td>
</tr>
<tr>
<td>Neisseria</td>
</tr>
<tr>
<td>Pseudomonas</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
</tr>
</tbody>
</table>

CONS: Coagulase-negative Staphylococcus
cefoperazone (70%) and complete resistance to ampicillin followed by amikacin (50%). *Pseudomonas* showed high resistance to ceftazidime (75%) and piperacillin (75%) and complete sensitivity to netilmicin and amikacin. *Klebsiella* showed 100% resistance to piperacillin, gentamicin and amikacin and 67% sensitivity to meropenem and netilmicin. Sensitivity of coliforms to meropenem and amikacin was 100% and 71.42%, respectively (Figure 2).

All Gram-positive organisms showed high resistance to ampicillin, penicillin, and high sensitivity to vancomycin, linezolid, and netilmicin. Gram-negative organisms had high resistance to ampicillin, piperacillin, and quinolones and were highly sensitive to amikacin, netilmicin, and meropenem.

**DISCUSSION**

In this study Gram-positive organisms (51.92%) dominated over Gram-negative organisms (48.08%) which correlated with various other studies.9-11 However, some studies have found the frequency of isolation of Gram-negative organism more than Gram-positive organisms.12-14

*Acinetobacter* was the predominant organism isolated in our study (19.23%). It is important to highlight the fact that over the recent years *Acinetobacter* has been isolated as an important pathogen in neonatal sepsis. Incidence of *Acinetobacter* reported by Shete et al. from India and Shamsul et al. from Nepal was 10.8% and 9.5%, respectively15,16 whereas Jarousha et al. from Iran reported the incidence to be 6.9%.17 Increasing rates of *Acinetobacter* infections may be due to lapses in infection control and prolonged hospitalizations in preterm infants.18 *S. aureus* and *Enterococcus* were also significant organisms in our study (15.38%). This pattern slightly differed from the findings from various other studies where *Klebsiella* and *S. aureus* were the predominant organisms.19-22 Recent data from Pakistan and India reveals that *S. aureus*, *Klebsiella*, and *E. coli* are the usual organisms in neonatal units, with high incidence of multi-drug resistance.22,23 *Enterococcus* is

![Figure 1: The antibiotic resistance pattern (%) of Gram positive bacteria](image1)

![Figure 2: The antibiotic resistance pattern (%) of Gram negative bacteria](image2)

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### Table 2: Resistance and sensitivity pattern of organisms

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Gram-positive resistance</th>
<th>Gram-positive sensitive</th>
<th>Gram-negative resistance</th>
<th>Gram-negative sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
<td>27 (100)</td>
<td>0</td>
<td>NT*</td>
<td>NT</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>10 (43.48)</td>
<td>13 (56.52)</td>
<td>11 (44)</td>
<td>14 (56)</td>
</tr>
<tr>
<td>Linezolid</td>
<td>0</td>
<td>21 (100)</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>Netilmicin</td>
<td>0</td>
<td>8 (100)</td>
<td>4 (22.22)</td>
<td>14 (77.78)</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>1 (6.67)</td>
<td>14 (93.33)</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>Cefalotin</td>
<td>14 (77.78)</td>
<td>4 (22.22)</td>
<td>16 (64)</td>
<td>9 (36)</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>6 (42.86)</td>
<td>8 (57.14)</td>
<td>16 (76.1)</td>
<td>5 (23.81)</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>0</td>
<td>8 (100)</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>NT</td>
<td>NT</td>
<td>8 (36.36)</td>
<td>14 (63.64)</td>
</tr>
<tr>
<td>Meropenem</td>
<td>NT</td>
<td>NT</td>
<td>2 (11.76)</td>
<td>15 (88.24)</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>NT</td>
<td>NT</td>
<td>5 (71.43)</td>
<td>2 (28.57)</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>27 (100)</td>
<td>0</td>
<td>19 (95)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Amikacin</td>
<td>NT</td>
<td>NT</td>
<td>11 (44)</td>
<td>14 (56)</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>12 (57.14)</td>
<td>9 (42.86)</td>
<td>NT</td>
<td>NT</td>
</tr>
</tbody>
</table>

*NT: Not tested*
also another pathogen in serious nosocomial infection in newborns. The incidence of the organisms causing sepsis has increased three folds over the recent years.\textsuperscript{24}

In our study, Acinetobacter species was completely resistant to ampicillin (100%). They were more sensitive to gentamicin and cefoperazone (70%). Najeeb et al.\textsuperscript{25} and Jayamurugan et al.\textsuperscript{19} also described high resistance of these bacteria against ampicillin and commonly used antibiotics. Multidrug-resistant Acinetobacter is also of growing concern in neonatal sepsis.\textsuperscript{26} Among other Gram-negative isolates which included coliforms, Klebsiella, and Pseudomonas the best sensitivity was observed to meropenem (92.85%) and netilmicin (78.57%). Sensitivity to amikacin and gentamicin were almost similar (55.5%) and (64%). High resistance was noted to ampicillin (88.8%). The findings were similar to a study conducted by El-Din et al.\textsuperscript{27} from Egypt where they observed high sensitivity to meropenem and quinolones, intermediary resistance to gentamicin and amikacin and complete resistance to ampicillin.

In the Gram-positive group, complete sensitivity was seen to linezolid, netilmicin, and teicoplanin (100%) followed by vancomycin (93.33%) and gentamicin (56.52%) while complete resistance was observed to penicillin and ampicillin. This pattern of resistance was similar to studies conducted in Nepal,\textsuperscript{15} Gujarat,\textsuperscript{28} and Kanpur.\textsuperscript{29} In our study, Staphylococcus was completely sensitive to vancomycin though methicillin resistance was noted in 25%.

**CONCLUSION**

This study identified Acinetobacter, S. aureus, and Enterococcus and coliforms as the predominant causative agents of neonatal sepsis in our unit, of which the emergence of Acinetobacter is of concern. The alarmingly high resistance pattern to penicillin which is used as first-line antibiotic in our unit should be seriously considered when formulating antibiotic policy for empirical therapy. Various antibiotic combinations and the usage of newer antibiotics should also be judicious. Strict infection control measures in the NICU still stands the best along with constant monitoring and surveillance of neonatal bloodstream infection to avoid the emergence of multidrug-resistant organisms.

Limitations of our study include its retrospective nature, and similar set of antibiotics were not tested always for sensitivity of organisms.

**ACKNOWLEDGMENT**

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Correlation between High-density Lipoprotein Cholesterol Level and CD4 Cell Count in HIV Patients on NNRTI-based ART Regimen at Tertiary Care Hospital in Mysuru

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Abstract

Introduction: India accounts for roughly half of Asia's HIV prevalence. ART can prolong quality of life in HIV infected patients. The current follow up pattern in India is on the basis of CD4 counts which are done in higher ART centers once in 6 months. The lipid derangement is very well known to happen in HIV patients patients on ART. In this study we tried to evaluate changes in lipid profile with CD4 counts of patients on ART. Since lipid profile can be done even in peripheral setup and it is economical, it will help in the management of HIV patients in peripheral centers.

Material and Methods: 102 HIV patients visited ARTC at KR Hospital Mysore (starting from Dec 2013 to Dec 2014) age group between 20-50 yrs on NNRTI based ART for a minimum of 3 months are included in this study. For all the patients CD4 count leveland lipid profile is done.

Results: Out of 102 patients included in the study, majority were males [73%] and mean age group was 37.12 yrs. when CD4 count considered, majority of females [86%] had CD4 count >200. This may indicate good drug compliance among females when considered to males. Correlation analysis shows that there is significant correlation between CD4 count and HDL while other parameters of lipid profile show no significant correlation. This concludes high HDL value in a patient on NNRT can indicates high CD4 count and a good immunity.

Conclusion: This study confirms that the HDL cholesterol has significant impact in predicting the level of CD4 cell counts in treating with NNRTI ART regimen and we found positive correlation between both the parameters. So HDL cholesterol which is more economical test, even can be done in peripheral centres to assess the over all general condition of the patients on ART.

Key words: HIV, NNRTI, HDL cholesterol, CD4 count, lipoproteins

INTRODUCTION

The first cases of HIV infection in India were documented in 1986 among female sex workers (FSWs) in Chennai, Tamil Nadu. Subsequently, cases of HIV infection have been reported from every state. The HIV epidemic in India has followed the “type 4 pattern,” where new infections occur first among the most vulnerable populations (such as FSW and injecting drug users [IDU]), then spread to “bridge” populations (clients of sex workers and sexual partners of drug users) and then finally enter the general population.¹

A critical review of the HIV epidemic in India reveals the following trends:
- Young adults (15-49 years) account for 89% of the burden of HIV infection.
- The male-to-female ratio is 3:2.
- The states of Andhra Pradesh, Maharashtra, Karnataka, West Bengal, Tamil Nadu, Gujarat, and
Uttar Pradesh together account for 80% of the burden in India. The prevalence is <1% in the Northeastern states of Nagaland and Manipur.

- India has a “concentrated epidemic,” the prevalence being significantly higher among various high-risk groups (MSM, IDU, FSW, and STD clinic attendees) than among antenatal clinic (ANC) attendees.
- There is considerable variability in the spread of HIV infection in the country. At the district level, 87 districts had HIV prevalence <1% among ANC attendees and 47 had <5% prevalence among FSW in 2007. Several of these districts are in moderate and low-prevalence states such as Bihar, Chhattisgarh, West Bengal, and Gujarat.
- The predominant mode of transmission is heterosexual exposure, while it is injecting drug use in Northeastern states.
- HIV prevalence has been stable from 2002 to 2007.
- HIV prevalence among women attending ANC has declined from 2000 to 2007, indicating a decrease in the incidence of new infections.1
- ART can prolong the quality of life in HIV-infected patients. However, this needs a regular follow-up.
- Moreover, current follow-up pattern is on the basis of CD4 counts which are done in higher ART centers once in 6 months.
- Lipid derangements in HIV are a well-known fact. In this study, we tried to evaluate changes of CD4 count and lipid profile in HIV patients on first-line ART regimen to find out any possible correlation between these two parameters.
- If we can assess CD4 count with other parameters which can be done even in peripheral setup, then it will be easy to assess the general condition of the patient and will help to manage the HIV patients in peripheral centers. It will also help the physicians to assess the level of immunity in HIV-infected patients without a regular follow-up in ART centers.

**Monitoring CD4+T Cell Counts**

The CD4+T cell count is the laboratory test generally accepted as the best indicator of the immediate state of immunologic competence of the patient with HIV infection.

This measurement, which can be made directly or calculated as the product of the percentage of CD4+T cells (determined by flow cytometry) and the total lymphocyte count (determined by the white blood cell count (WBC) multiplied by the lymphocyte differential percent), has been shown to correlate very well with the level of immunologic competence.

Patients with CD4+T cell counts <200/dL are at high risk of disease from *Pneumocystis jirovecii*, while patients with CD4+T cell counts <50/dL are at high risk of disease from CMV, mycobacteria of *Mycobacterium avium* complex (MAC), and/or *Toxoplasma gondii*.

Patients with HIV infection should have CD4+T cell measurements performed at the time of diagnosis and every 3-6 months thereafter. More frequent measurements should be made if a declining trend is noted.

According to the U.S. Department of Health and Human Services Guidelines, a CD4+T cell count <500/dL is an indication for initiating cART, and a decline in CD4+T cell count of >25% is an indication for considering a change in therapy. Once the CD4+T cell count is <200/dL, patients should be placed on a regimen for *P. jirovecii* prophylaxis, and once the count is <50/dL, primary prophylaxis for MAC infection is indicated.

As with any laboratory measurement, one may wish to obtain two determinations before any significant changes in patient management based on CD4+T cell count alone. There are a handful of clinical situations, in which the CD4+T cell count may be misleading. Patients with HTLV-1/HIV coinfection may have elevated CD4+T cell counts that do not accurately reflect their degree of immune competence. In patients with hypersplenism or those who have undergone splenectomy and in patients receiving medications that suppress the bone marrow such as IFN-γ, the CD4+T cell percentage may be a more reliable indication of immune function than the CD4+T cell count. A CD4+T cell percent of 15 is comparable to a CD4+T cell count of 200/dL.2

**Principles of Antiretroviral Therapy**

A continuous high level of replication of HIV takes place in the body right from the early stages of infection. At least one billion viral particles are produced and destroyed each day. The antiretroviral drugs act on various stages of replication of HIV in the body and interrupt the process of viral replication. Theoretically, these drugs can act at the many steps in viral replication. Most commonly used drugs target the virus mainly by inhibiting the enzymes reverse transcriptase (RT) inhibitors and protease inhibitors.

Based on the scientific evidence, therapy guidelines have been developed by various international agencies such as the WHO, DHHS, BHIVA, and IAS. They define the optimum time, parameters, and drugs to initiate and sequence treatment.3

**Recommended Choices of First-line Regimens**

Principles for selecting the first-line regimen:
1. Choose 3TC (lamivudine) in all regimens
2. Choose one NRTI to combine with 3TC (AZT or d4T)
3. Choose one NNRTI (NVP or EFV).
Lipid Disorders in HIV Infection
The lipid disorders seen in individuals with HIV infection include elevated triglycerides (TG) and total cholesterol (TC), a decrease in high-density lipoprotein (HDL) cholesterol, and variable effects on low-density lipoprotein (LDL) cholesterol. The exact mechanism is still not clear, and the cause could be multifactorial. The individual contributions of HIV infection, specific antiretroviral agents, host genetics, and changes in body composition all should be considered.

Effect of HIV Infection on Lipid Profile
Abnormalities of lipid metabolism in HIV-infected patients were described before the use of HAART. Increased serum TG and reduced TC concentrations were observed in advanced HIV infection. Patients with advanced HIV infection or with AIDS have also had lower levels of HDL-C and LDL-C, increased TG level, and a predominance of small, dense LDL particles compared with HIV-negative individuals. In the early 1990s, a number of investigators described the lipid abnormalities associated with HIV infection. A consistent finding from these studies was that patients with advanced HIV infection or AIDS had high levels of circulating TG and low levels of HDL cholesterol.

METHODOLOGY
Study design contains two populations, visiting ART center in Krishna Rajendra Hospital starting from December 2013 to December 2014.
1. HIV-infected patients on NNRTI with CD4 counts >200 males and females.
2. HIV patients on NNRTI with CD4 counts <200 males and females.

Method of Collection of Data (Including Sampling Procedures if Any)
In Karnataka state, 2.5 lakh HIV-positive patients are taking ART treatment.
Sample size - 102 HIV-seropositive patients on NNRTI will be studied.

Sampling Method - Purposive Sampling
Statistical methods are Pearson correlation analysis, linear regression, and multivariate regression model.
- It is an exploratory study, in which HIV patients on NNRTI will be evaluated by CD4 count, and their HDL cholesterol level will be checked by the automated chemical analyser.
- NNRTI includes zidovudine or stavudine, lamivudine, and nevirapine in this study.

RESULTS
In this study, mean age group of the patients included is 37.12. When observing the age distribution of the included patients, 39% of the population were in between 35 and 41 years of age.

In this study, patients further grouped into two. CD4 count <200 group had a mean age of 35.67 years (SD of 7.76) and CD4 count >200 group had a mean age of 38.64 years (SD of 7.19). This observation is consistent with other studies conducted in India and abroad (Table 1).

In the present study, 27 patients (27%) were female and 74 patients were male (73%). This is consistent with a study conducted by Enrique Bernal et al., with male patients constituting 79%, Swiss HIV cohort study showed that male patients constituted 68%, and the study done by Indumati et al. showed that male patients constituted 60%. This indicates that most of the HIV patients taking ART treatment in ART centers are males (Table 2).

In this study, HIV patients on NNRT-based ART grouped into 2 categories with respect to CD4 count. CD4 count <200 had mean TC of 218.67 and CD4 count >200 had mean cholesterol of 185.36. Mean TC value is statistically same among patients with CD4 <200 and CD4 >200, P = 0.37 indicates that the mean value of TC among patients with CD4 <200 and CD4 >200 is same (Table 3).

In this study, HIV patients on NNRT-based ART grouped into 2 categories with respect to CD4 count. CD4 count <200 had mean TG of 248.08 and CD4 count >200 had mean TG of 213.31. Mean TG value is statistically same among patients with CD4 <200 and CD4 >200, P = 0.34
indicates that the mean value of TG among patients with CD4 <200 and CD4 >200 is same (Table 4).

In this study, HIV patients on NNRT-based ART with CD4 count <200 had mean LDL 88.08 and CD4 count >200 had mean LDL 99.05. Mean LDL value is statistically same among patients with CD4 <200 and CD4 >200, P = 0.07 indicates that the mean value of LDL among patients with CD4 <200 and CD4 >200 is same (Table 5).

In this study, HIV patients on NNRT-based ART with CD4 count <200 had mean HDL 31 and CD4 count >200 had mean HDL 43.31. Mean HDL with CD4 <200 and CD4 >200 is statistically different. P = 0.0 indicates that mean is not same among the patients with CD4 <200 and CD4 >200 (Graph 1).

DISCUSSION

Correlation analysis shows that there is a significant correlation between CD4 count and HDL while other parameters of lipid profile show no significant correlation at 5% significance level.

- TC has an insignificant impact on predicting CD4 count at 5% significance level.
- TG has an insignificant impact on predicting TG at 5% significance level.
- HDL has significant impact in predicting the CD4 counts at 5% significance level. R-square is 25.5% and P = <0.0001 which indicates that impact of HDL on CD4 count is highly statistically significant.
- LDL has an insignificant impact in predicting CD4 count at 5% significance level. P = 0.21 indicates that impact is statistically insignificant at 5% significance level.

Multiple regression model is developed to measure the impact of all the lipid profile variables in predicting CD4 counts. Impact of TC and HDL is statistically significant at 5% significance level.
Table 6: Multivariate regression model for CD4 count and lipid profile

<table>
<thead>
<tr>
<th>Lipid profile</th>
<th>Impact/beta coefficient</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>~0.699</td>
<td>0.0001</td>
</tr>
<tr>
<td>TG</td>
<td>0.120</td>
<td>0.289</td>
</tr>
<tr>
<td>HDL</td>
<td>8.77</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LDL</td>
<td>0.391</td>
<td>0.387</td>
</tr>
</tbody>
</table>

TC: Total cholesterol, LDL: Low-density lipoprotein, TG: Triglycerides, HDL: High-density lipoprotein

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TC has a negative impact on the CD4 counts, whereas HDL has a positive impact on the CD4 counts.

This study has limitations while considering sample size, which is small. We evaluated patients on a group of drugs (first-line regimen of NNRTI) individual drugs in first-line NNRT-based regimen and their effect on lipid profile did not evaluate. In HIV patients, other drug intakes for opportunistic infections are common. Such drug’s effect on lipid profile did not evaluate.

CONCLUSION

A total of 102 patients were included in the study. Patients were distributed from age 20 to 56 years with mean age of 37.12 years. Majority of the population were in between 35 and 41 years of age. Out of 102 patients, 28 patients (27%) were female and 74 patients were male (73%). In this sample, female’s CD4 counts were better than male’s which showed better drug compliance among females than males.

Patients were grouped into 2 categories based on CD4 count (<200/>200). Lipid profile of these patients in 2 groups evaluated separately. Mean value of HDL is not same among the patients with CD4 <200 and CD4 >200. Showed significant difference in the mean HDL among both categories of CD4 Count. Correlation analysis shows HDL that has a significant impact in predicting the CD4 counts.

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Study on Cardiovascular Autonomic Function Tests on Young Healthy Males and Females

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Abstract

Background: Autonomic neuropathy is a common complication of several systemic disorders like diabetes mellitus. To combat that its early detection is essential. However, to understand the pathophysiological states, there should first be a standardization of these values in normal healthy adult people, and our venture in this study is prompted by this need. We have also deliberately used multiple simple tests without using any costly equipment keeping in mind the large poor community of crores in developing countries and more so in a rural and semi-urban base in India.

Materials and Methods: Heart rate (HR) and blood pressure (BP) responses in the following situations were noted as cardiovascular function tests: Supine position, at rest, standing position from supine, tilted supine position (head up tilt), valsalva maneuver, isometric exercise, and cold pressor test. The parameters recorded were HR, systolic BP (SBP), diastolic BP (DBP), and mean arterial BP (MABP). Before doing each test time was given for the physiological parameters such as BP and HR to come to the basal value.

Results: The results show that the mean ± standard deviation for mean blood pressure and HR changes in head up test 0.785 ± 5.32 and 0.267 ± 4.997, respectively, in males and 0.267 ± 3.976 and 0.450 ± 5.349, respectively, in females. Vasoconstrictor reserve 3.67 ± 2.844 in males and 1.78 ± 1.993 in females. SBP rise and DBP rise during cold exposure test 2.844 ± 5.262 and 1.552 ± 4.629, respectively, in males and 0.450 ± 3.445 and −0.225 ± 3.238, respectively, in females. While the valsalva ratio (VR) was highly significant and SBP, DBP rise during cold exposure was significant. VR 1.241 ± 0.067 in males and 1.119 ± 0.039 in females was highly significant. Tachycardia ratio 1.266 ± 0.071 in males and 1.144 ± 0.044 in females was highly significant. Standing BP and HR from supine position 0.1185 ± 3.746 and 1.600 ± 3.563, respectively, in males was significant and 2.429 ± 3.213 and 1.794 ± 3.853, respectively, in females was not significant (P > 0.05 means statistically not significant, P < 0.05 significant and P < 0.01 highly significant).

Conclusion: We have prepared through our study standardized normal values of various data related to autonomic functions among healthy young adults in eastern India. It is seen from this study that parasympathetic responses showed that maximum responses were more in case of males. Sympathetic responses showed that maximum responses were more in males and in some cases more in females. Studies involving larger population should be employed with sophisticated methods of analysis of HR variability and with more specific tests to validate our observations.

Key words: Cardiovascular autonomic function tests, Cold pressor tests, Vasoconstrictor reserve, Valsalva ratio, Tachycardia ratio

INTRODUCTION

The term autonomic nervous system (ANS) was coined by Langley a century ago.¹ It was meant for controlling most of the visceral activities which were involuntary and could not be easily modified, hence called “autonomic.” It maintains internal homeostasis by regulating cardiovascular, thermoregulatory, gastrointestinal, genitourinary, exocrine, and pupillary functions.²

ANS can be studied noninvasively and reproducibly by a battery of well-accepted autonomic function tests. In general, the tests are designed to assess cardiovagal, adrenergic and sudomotor functions.³ ⁴

In this study, it is tried to evaluate the cardiovascular autonomic functions and their correlations, if any in
healthy young males and females in basal states as well as in physiological stressful conditions.

**MATERIALS AND METHODS**

Materials and methods used in the study were as follows.

**Study Setting and Design**
This was an institutional cross-sectional study which was conducted in the Department of Physiology, North Bengal Medical College and Hospital (NBMCH), West Bengal, India.

**Study Duration**
This was studied over a period of 1 year starting from April 2013 to April 2014.

**Study Population**
A total of 85 students in the 1st year MBBS class of NBMCH, West Bengal, India, were studied after taking proper informed consent from them.

**Sampling Design**
The 1st year students were divided into two groups, i.e., males and females. Then from each group, students were taken as per inclusion and exclusion criteria.

**Inclusion Criteria**
Students in the 1st year MBBS class both males and females of NBMCH were included in our study after taking history followed by doing a general examination.

**Exclusion Criteria**
Any students found having major past or any existing cardiovascular or neurological illness, history of taking any long-term medication or having any addiction were excluded from the study. Female students during bleeding phase of menstrual cycle were also excluded.

**Parameters Studied**
Heart rate (HR) and blood pressure (BP) responses in the following situations were noted as cardiovascular function tests:
1. Supine position, at rest,
2. Standing position from supine,
3. Tilted supine position (head up tilt),
4. Valsalva maneuver,
5. Isometric exercise,
6. Cold pressor test.

**Study Tools**
This consists of standard clinical tools including:

a. Electrocardiography (ECG) machine (BPL, CARDIART 108T DIGI),
b. Mercury sphygmomanometer,
c. Stethoscope,
d. Tilt table,
e. Ice and cold water,
f. Thermometer,
g. Dynamometer.

**Method of Study**
Permission was taken at first from the principal and ethics committee, NBMCH.

**Collection of Data**
Every volunteer was explained about the purpose and procedure of the study, and a written consent was taken from each one of them. They were made familiar with equipment and instructed to discontinue the test if they faced any discomfort and report immediately. The tests were done after a light breakfast in the morning.

**Procedure Employed**
The parameters recorded were HR, systolic BP (SBP), diastolic BP (DBP), and mean arterial BP (MABP). Before doing each test time was given for the physiological parameters such as BP and HR to come to the basal value.

**Supine position**
Keeping the patient fully relaxed in supine position for 10-20 min, radial pulse rate was counted for 1 min with simultaneous auscultation of heart sounds to get the resting HR and also by doing ECG (counting the R-R interval in ECG). Basal BP was measured in this condition by palpatory and auscultatory method.

**Standing position**
From the supine position, with the BP cuff and the ECG monitor attached the patient was instructed to stand up abruptly. Within 15 s of standing, HR and BP were recorded. The measurements repeated after 1 min, 2 min, and 3 min time. The mean HR was calculated as the average of the longest and shortest R-R interval.

**Tilted supine position (response to head-up tilt)**
The subject was placed supine over the tilt table for 10 min and after that with the ECG leads and BP cuff connected, the head end of the table was inclined upward to an angle of 70° with horizontal plane. The immediate response of HR and BP was noted.

**Valsalva maneuver**
It is a test done to assess the low and high-pressure baroreceptor integrity. Changes in the arterial BP and HR were noted to assess the response to valsalva maneuver.
The subject was instructed properly before the procedure. Then, with continuous ECG monitoring, the subject was asked to exhale forcefully for about 15-20 s against resistance of 40 mmHg in an open loop system. The BP of each subject was measured during the Valsalva maneuver and also immediately after that. The continuous ECG was taken 1 min before (resting period), during the procedure (15 s, strain period), and 1 min subsequent to strain period. The VR, the ratio of the maximum R-R interval during expiratory phase (Phase II) to the minimum R-R interval during the relaxation phase (Phase IV, within 20 beats) was calculated. The tachycardia ratio (TR) was also calculated.

\[ VR = \frac{\text{Longest R-R interval after Valsalva}}{\text{shortest R-R interval during Valsalva}} \]

\[ TR = \frac{\text{shortest R-R interval during Valsalva}}{\text{longest R-R interval after Valsalva}} \]

**Isometric exercise**

During sustained isometric exercise the BP increases due to increase in peripheral resistance and also increases in cardiac output (CO). The subject was instructed to perform hand grip in a dynamometer giving as much pressure as he/she could apply for 3-4 s which was maximum voluntary contraction. Then, he/she was instructed for a sustained hand grip exercise maintaining a pressure of 30% of maximal activity for 1 min with that dynamometer. The shortest R-R interval during the exercise and the longest R-R interval while relaxed (within 5 beats) are determined. The change in DBP from the basal value was recorded. Vasoconstrictor reserve was calculated then.

\[ \text{Vasoconstrictor reserve} = (\text{Maximum diastolic pressure at the end of 1 min of sustained isometric hand grip} - \text{baseline diastolic pressure}) \]

It evaluates mainly the sympathetic function.

**Cold pressor test**

After proper instructions, the subject was asked to submerge one of the upper limbs in very cold water (at or below 4°C) in a container for 60 s. The BP and HR were recorded at 30 s, 60 s, 90 s, and 120 s of submersion of the limb.

Plunging the limb in cold water raises the BP reflex by stimulation of the sympathetic system.

**Statistical Analysis**

- Statistical analysis was performed using statistical software ‘SPSS version 16.0’ (SPSS Corp, Chicago, IL, USA).
- Comparison among males and females form their basal state to various stressful conditions were tested using paired t-test while comparison of similar tests between two genders was done using unpaired t-test.

**RESULTS**

Results of our study are given in the following charts (Tables 1 and 2) and diagrams (Figures 1-3).

**DISCUSSION**

Among the various functions done by ANS, one of the most important fields is its effect on chorionic villus sampling (CVS). There are also different effects of it on CVS between the genders. Clinical and experimental evidence suggest that gender difference has a significant influence on the ANS activities including that on the CVS. Gender difference in the incidence and clinical course of a range of CVS responses such as BP, CO, HR, and other variables are also well recognized. Studies of Huikuri et al. have shown that females have decreased baroreceptor responsiveness as compared to males. Furthermore, hormone replacement therapy has got favorable effect on baroreceptor responsiveness suggesting that hormonal factors may have some role in autonomic modulation. Baroreflex sensitivity is decreased in women as compared with men, but tonic vagal regulation

**Table 1: Comparative study of sympathetic functions on the sample**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean±SD</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head up tilt test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBP</td>
<td>0.785±5.32</td>
<td>0.267±3.976</td>
<td>0.616</td>
</tr>
<tr>
<td>HR</td>
<td>0.267±4.997</td>
<td>0.450±5.349</td>
<td>0.871</td>
</tr>
<tr>
<td>Vasoconstrictor reserve</td>
<td>3.67±2.844</td>
<td>1.78±1.993</td>
<td>0.001 Highly significant</td>
</tr>
<tr>
<td>Cold exposure test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBP rise</td>
<td>2.844±5.262</td>
<td>0.450±3.445</td>
<td>0.016 Significant</td>
</tr>
<tr>
<td>DBP rise</td>
<td>1.522±4.629</td>
<td>-0.225±3.238</td>
<td>0.050 Significant</td>
</tr>
</tbody>
</table>

SD: Standard deviation, MBP: Mean blood pressure, HR: Heart rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean±SD</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>VR</td>
<td>1.241±0.067</td>
<td>1.119±0.039</td>
<td>0.000 Highly significant</td>
</tr>
<tr>
<td>TR</td>
<td>1.266±0.071</td>
<td>1.144±0.044</td>
<td>0.000 Highly significant</td>
</tr>
<tr>
<td>Standing BP</td>
<td>0.1185±3.746</td>
<td>2.429±3.213</td>
<td>0.003 Significant</td>
</tr>
<tr>
<td>Standing HR</td>
<td>1.600±3.563</td>
<td>1.794±3.853</td>
<td>0.810 Not significant</td>
</tr>
</tbody>
</table>

VR: Valsalva ratio, SD: Standard deviation, BP: Blood pressure, HR: Heart rate, TR: Tachycardia ratio
of HR is augmented. Baroreflex sensitivity and HR variability are higher in postmenopausal women who are on estrogen replacement therapy compared with those without therapy suggesting that hormonal factors may partly explain the sex-related differences in autonomic modulation of HR.7

Outcome after myocardial infarction is worse for women than men8,10 while women with nonischemic cardiomyopathy have improved survival. In addition, to the well-known difference in age of presentation of coronary heart disease women are more likely to suffer from Raynaud’s phenomenon and to experience presyncopal and syncopal episodes.11,12

In this study, we found mean blood pressure (MBP) decreased during standing in both genders (though the decrement was more in females) while the HR increased in both genders (increment more in females). In the study, the decrease in BP was significant in females ($P < 0.03$) but increase in HR was not significant in females ($P > 0.05$).

In a study conducted by Narhare et al., decrease in MBP was more in male during standing posture from supine state.22

In this study during isometric exercise test, done by a hand grip dynamometer it was found that there was less vasoconstrictor reserve in case of females than their male counterparts. Moreover, the difference was of significant value ($P < 0.01$).

A similar study was conducted by Pramanik and Singh showed that in the normal persons SBP and DBP increased after 1 min of handgrip test. However, the rise in SBP in females was not significant. In females with occasional postural hypotension, the vasoconstrictor reserve was significantly less ($P < 0.05$) than in the control females. Result indicated less reserve in females compared to their male counterparts.13 The study corroborates our observations.

In another study from Amritsar,14 sympathetic activity was compared by galvanic skin resistance (GSR), cold pressor response, and handgrip test. Result showed SBP and DBP rise was more in the case of males in all age groups than female counterparts during handgrip test. However, the results were statistically insignificant.

In still another study by Mehta et al.15 hand grip response showed that the rise in SBP was more in case of males ($P < 0.5$) and DBP rise was more in case of females ($P < 0.01$).

In a study in 1993 in Finland16 on males and females it was observed that the HR response to the Valsalva maneuver was greater in females of more than 50 years age than males of same age. The DBP response to isometric handgrip was higher in males of <50 years age than females of same age.

During an upright tilt, or for that matter while standing, a person’s cardiovascular system has to adjust itself to prevent a significant portion of the blood volume from pooling in the legs. These adjustments consist of an increase in DBP, MBP and HR, and peripheral vascular resistance which is mainly due to increase sympathetic outflow by the effect of baroreflex activation due to
pooling and redistribution of blood from the upper and to the lower part of the body (central hypovolemia) resulting in a reflex tachycardia and vasoconstriction to maintain a normal BP.\textsuperscript{17,19} When a normal individual is placed in an upright tilt, these cardiovascular adjustments occur very quickly, and there is no significant drop in the BP.

The study also showed that MBP was more in males and HR was more in females during head-up tilt to 60° though the differences were not significant among genders as evident from ($P > 0.05$).

In a study by Yesar et al., BP, CO, HR, and ECG vascular resistance were measured. All measurements were 1st done in supine position and then at 60° head up tilt table. Result showed a significant difference between the two sexes in both age groups.\textsuperscript{20}

Under condition of stress of either physical or psychological origin, there is activation of sympathetic NS. The cold pressor response, which consists of placing the hand in cold water as painful stimulus, is used to study the autonomic response of different individuals.

In this study, it was found that SBP arose both in case of males and females and DBP arose in case of males only while there was fall in DBP in the case of females during cold exposure test from basal state. The comparison of SBP rise in between genders was statistically significant ($P = 0.016$). Comparison of DBP change from basal value between genders was also of significant difference ($P < 0.05$).

The fall in DBP in the case of females during cold exposure test can’t be explained, and a more number of studies are required to corroborate the findings.

A more number of studies with more sophisticated approach are required to corroborate our findings.

**CONCLUSION**

We have prepared through our study standardized normal values of various data related to autonomic functions among healthy young adults in eastern India. It is seen from this study that:

- Parasympathetic responses showed that maximum responses were more in case of males
- Sympathetic responses showed that maximum responses were more in males and in some cases more in females.

Studies involving larger population should be employed with sophisticated methods of analysis of HRV and with more specific tests to validate our observations.

**REFERENCES**

Evaluate the Role of Various Early Predictors and Computed Tomography in Assessing the Severity of Acute Pancreatitis

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ABSTRACT

Background: Acute pancreatitis is a common and the most unpredictable of abdominal emergencies.

Materials and Methods: The present study “to evaluate the role of various early predictors and computed tomography in assessing the severity of acute pancreatitis” was conducted in the Postgraduate Department of General Surgery, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu. 40 patients were included in the study irrespective of age and sex of the patients. A full consent for the study was obtained from each patient separately after explaining completely about the study.

Conclusion: The early assessment of severity of acute pancreatitis is important and crucial to identify the patients who are at risk of developing life-threatening complications and to decrease the mortality in acute pancreatitis by providing intensive treatment to those who are likely to have severe disease.

Key words: Acute, APACHE, Pancreatitis, Ranson’s

INTRODUCTION

Acute pancreatitis is a common and the most unpredictable of abdominal emergencies. Acute pancreatitis presents as an inflammatory disease that is characterized clinically by sudden onset of symptoms in a previously healthy individual and disappearance of those symptoms as the attack resolves. The clinical course of acute pancreatitis can vary from mild, self-limiting attack to severe systemic illness, and at times with fatal outcomes. In 1901, Opie described the association of gallstones to acute pancreatitis. Alcohol was firmly established as an important prognostic factor in 1917. Approximately 300,000 cases of acute pancreatitis occur in the USA per year, 10-20% of which are severe leading to over 3000 deaths.¹⁻⁸

Acute pancreatitis presents with multiple etiologies. Most common 70-80% cases are due to biliary stone disease and alcohol abuse. 10-15% cases are idiopathic and remaining are associated with one of many possible miscellaneous causes such as hyperlipidemia, hypercalcemia, post-operative endoscopic retrograde cholangiopancreatography (ERCP), and trauma.

The diagnosis of acute pancreatitis is mainly clinical and supported by laboratory tests. Early clinical findings such as upper abdominal pain, fever, vomiting, tachycardia, restlessness, dehydration, and hypoactive bowel sounds are all unreliable in predicting the diagnosis and prognosis of acute pancreatitis and this account for increasing use of various types of prognostic indicators with promising sensitivity and specificity ranging between 65-100% and 70-100%, respectively.⁸⁻¹⁵

Laboratory test most commonly used for the assessment of acute pancreatitis are serum amylase and serum lipase determination but a judicious combination of both serum amylase and lipase determination may give better
Serum amylase is the group that degrades complex carbohydrates into glucose supplements. Serum contains two amylase isoenzymes, pancreatic or p-type and salivary or s-type in a ratio of 40:60, respectively. Serum amylase determination is most likely used laboratory test for diagnosis of acute pancreatitis.

Serum lipase is mainly derived from pancreatic acinar cells, where it is synthesized and stored in granules. The specificity (50-99%) and sensitivity (86-100%) of lipase measurement is better than those of amylase, particularly in detecting alcoholic pancreatitis.

Abdominal ultrasonography (USG) is the initial imaging modalities. USG is often utilized for diagnosis of patients with acute abdominal pain. In acute pancreatitis patients, USG is important in evaluation of gallbladder and biliary tract to detect possible gallstones and biliary obstruction.

The first numeric system for predicting the severity of acute pancreatitis was proposed by Ranson et al. in 1974 is still the most widely used system.

Acute Physiology and Chronic Health Evaluation-II (APACHE-II) is a severity of disease classification system (Knaus et al. 1985). This score uses 12 routinely available physiological and laboratory measurements with an additional weighting of age and pre-admission health status. It is applied within 24 h of admission.

Contrast-enhanced computed tomography (CECT) has become the standard imaging method in diagnosing and staging acute pancreatitis and its complications (Balthazar et al. 1990). It allows complete visualization of the pancreas and retroperitoneum, to stage the severity of disease, to detect pancreatic necrosis, and to depict local complications such as fluid collections, pseudocysts, and abscesses. The diagnostic accuracy of contrast-enhanced CECT findings has proved high, reaching a specificity approaching 100% (Clavien et al. 1989 and Balthazar et al. 1994). The use of CECT for the primary diagnosis is impossible due to the limited availability and high costs. Furthermore, CECT may be normal in 8-28% of patients with AP, especially in mild form of disease.16-20

Keeping in mind, that is, the importance of early prediction of the severity of acute pancreatitis, a study was conducted in Postgraduate Department of General Surgery, at Acharya Shri Chander College of Medical Sciences and Hospital, JAMMU, from October 2014 to October 2015 to assess the severity of acute pancreatitis using various early predictors and CECT.

**MATERIALS AND METHODS**

The present study “to evaluate the role of various early predictors and computed tomography in assessing the severity of acute pancreatitis” was conducted in the Postgraduate Department of General Surgery, Acharya Shri Chander College of Medical Sciences and Hospital, Jammu.

A total of 40 patients were included in the study irrespective of age and sex of the patients.

The diagnosis of acute pancreatitis was based on following criteria:

- History of pain in abdomen with tenderness and guarding on palpation.
- An elevated serum amylase and serum lipase levels.
- Documentation of acute pancreatitis on ultrasound abdomen.
- A complete history of general physical examination and systemic examination was done.

CECT scan abdomen: It was done in all patients within 48 h of admission and computed tomography severity index (CTSI) was calculated as follow.

**RESULTS**

The following observations were made.

**Sex and Age**

Out of 40 patients, 17 patients were male and 23 patients were female.

**Age Distribution**

The mean age of the patients was 47 years. The youngest patient was 14-year-old and the oldest patient was 75-year-old. Majority of the patients (42.5%) were between 30 and 50 years of age.

**Symptomatology**

The most common presenting symptom of the patients was pain abdomen present in all patients (100%).

Pain epigastrium and vomiting were present in 13 patients (32.5%), followed by pain right hypochondrium and vomiting were present in 11 patients (27.5%). Pain epigastrium with yellowish discoloration of eyes was present in 1 patient (2.5%).
On examination, tenderness in epigastrium was found in 18 patients (45%), tenderness in epigastrium with right hypochondrium was found in 12 patients (30%). In 1 patient, tenderness was found in whole abdomen (2.5%).

**Comorbidities**
Out of 40 patients, associated diseases were present in 15 patients. These included hypertension in 9 patients (22.5%), diabetes mellitus in 2 patients (5%), and both hypertension and diabetes mellitus in 4 patients (8.3%). The most common associated comorbid medical condition was hypertension.

**Etiology**
Out of 40 patients, gallstones were present in 26 patients (65%). In 14 patients (35%), alcoholism, post-cholecystectomy, and idiopathic etiology were found.

**Diagnosis**
Diagnosis of acute pancreatitis was based on clinical features, serum amylase estimation, serum lipase estimation, and USG abdomen.

**Serum Amylase Levels**
Serum amylase levels were elevated at presentation in 34 patients (85%) and normal in 6 patients (15%) (normal range of serum amylase 25-150 U/L).

**Serum Lipase Levels**
Serum lipase was elevated at presentation in 27.5% of patients (normal range of serum lipase 0-160).

Serum lipase was more specific in diagnosing acute pancreatitis than serum amylase.

The sensitivity and specificity of serum amylase was 71% and 15%, respectively, whereas sensitivity and specificity of serum lipase was 64% and 96%, respectively. The mean range of serum amylase and lipase in patients with gallstone pancreatitis was 1051.61 ± 748.65 and 315.15 ± 179.56 and with non-gallstone pancreatitis was 979.36 ± 551.57 and 609.71 ± 343.53, respectively.

**Ultrasonography**
USG was done in all patients. It was suggestive of acute pancreatitis in all 40 cases (100%). Acute pancreatitis with cholelithiasis was found in 27 (67.5%) patients. Out of those 2 (5%), patients had focal necrosis on USG.

**Investigations**
Out of 40 patients, 28 patients had leukocytosis (thin-layer chromatography [TLC] >11000/mm³) at the time of presentation, whereas leukocyte count was normal in 12 patients (TLC <11000/mm³).

Deranged renal function tests were present in 15 patients (37.5%).

**Early Predictors in Assessing the Severity of Acute Pancreatitis**
Assessment of severity was done using Ranson's scoring, APACHE-II scoring, and CTSI score using CECT abdomen within 72 h of admission.

**Ranson’s Scoring**
Ranson’s scoring predicted that the attack of pancreatitis will be severe in 17 patients (Ranson's score >3). However, out of these 17 patients, 13 patients actually had disease, whereas 4 patients had mild disease.

Ranson’s score predicted that the attack of acute pancreatitis will be mild in 23 patients (Ranson's score <3). However, out of these 23 patients, 7 had severe disease and 16 patients had mild disease.

Thus, the sensitivity and specificity of Ranson’s scoring in predicting the severity of attack in acute pancreatitis in our study is 65% and 80%, respectively.

- Sensitivity of Ranson’s scoring:- \( \frac{a}{a+b} \times 100 = \frac{13}{13+7} \times 100 = 65\% \)
- Specificity of Ranson’s scoring:- \( \frac{d}{d+c} \times 100 = \frac{16}{16+4} \times 100 = 80\% \)

**CECT Abdomen**
Contrast-enhanced CT scan abdomen was done in all patients within 72 h of admission. CTSI was calculated using Balthazar scoring system.

16 patients were predicted to have severe attack (CTSI >7) out of 40 patients.

CECT abdomen predicted that the attack of acute pancreatitis will be mild in 24 patients. However, out of 24 patients, 19 patients had mild attack of pancreatitis and 5 had severe attack.

Thus, the sensitivity and specificity of CECT scan abdomen in assessing the severity of acute pancreatitis was 75% and 95%, respectively.

**Hospital Stay**
The average duration of hospital stay for patients with acute pancreatitis was 8.6 days. Shortest duration of hospitalization was 4 days and longest was 23 days.

**Mortality**
Out of 48 patients, only one patient died. The death was because of multiple organ dysfunctions syndrome. The patient developed respiratory and cardiac failure. Thus, the mortality of the disease in our study was 2.5%.
DISCUSSION

Acute pancreatitis is a common ailment encountered by surgeons in any part of the world and it forms a good proportion of emergency admissions in surgical emergency units. Although approximately 80% of patients have mild disease that resolves spontaneously with little morbidity, the remaining 20% suffer from severe attack with mortality rates as high as 30%. A number of studies have been conducted to find out the best measures to assess early the severity of acute pancreatitis. Comparisons of Ranson, BISAP, APACHE-II, CRP, CTSI scores, comparisons of Ranson, Glasgow, MOSS, SIRS, BISAP, APACHE-II, CTSI scores, IL-6, CRP, and procalcitonin comparative study of BISAP, Ranson, and CTSI scores, risk stratification in acute pancreatitis, assessing the severity using biochemical markers; serum amylase, lipase, IL-6, IL-8, CRP, procalcitonin, PMN elastase, TAP, etc.21-26

In the present study, out of 40 patients, 17 patients (42.5%) were male and 23 patients (57.5%) were female, which is similar to the observation made by Blamey et al. (1984) who studied 408 patients with males representing 43% and females 57% of the total. The sex distribution of the disease reported in other studies is as follows Jacobs et al. (1977) males 54.9% and females 36.3%, Askel et al. (1986) males 68.6% and females 31.4%, respectively. In the study conducted by Khanna et al., 72 patients were screened there were 51.4% of males and 48.6% of females. Yadav et al. (2015) reported 70.6% males and 29.4% females from their study. In our study, there is slightly higher preponderance of females.27-32

The mean age of the patients in our study was 47 years. The mean age was found to be 44 years by Askel et al. (1986) and 53.8 years by Jacobs et al. (1977). Khanna et al. reported mean age as 40.5 years and Yadav et al. (2015) reported mean age as 38.9 years. The mean age of patients in the present study is comparable with the finding of Mir et al. (2013).

The most common presenting symptom in our patients was pain abdomen. Pain in epigastrium was most common site with vomiting presented in 32.5% of patients. In our study, vomiting was present in 27 patients (72%) which are almost similar to Jacob et al. (1977).

Jacobs et al. (1977) in their study found that associated diseases were present in 33% of patients; diabetes mellitus was present in 9.8% of patients. Fan et al. (1989) found that out of 203 patients of acute pancreatitis in their study, diabetes was present in 10% patients.

In the present study, 67.5% of the patients had biliary tract stone disease, 10% had alcoholism, 7.5% patients had idiopathic pancreatitis, and 2.5% had pancreatitis post-cholecystectomy. Fan et al. (1989) found in their study that 55.7% of the attacks occurred due to the gallstones, 16.7% due to alcoholism. Pierre-Alain et al. (1988) reported the etiology of acute pancreatitis in their study as gallstones 55%, alcoholism 39.2%, and idiopathic 11%. Wilson et al. observed the etiology as gallstones in 43%, alcoholism 64%, idiopathic 30%, and post-ERCP in 3.4%. Khanna et al. reported the etiology as biliary 64%, alcoholic 13%, idiopathic 9%, post-ERCP 2%, trauma 2%, and hypertriglyceridemia (2%). Yadav et al. (2015) reported alcohol as most common cause accounting for 40.3% followed by gallstones. Cho et al. found etiology as gallstones in 54% of cases, alcohol in 22%, idiopathic in 21%, and others in 3% of cases.

In the present study, on 40 patients, 34 patients (85%) had elevated levels of serum amylase at time of presentation. According to the “Manigots Abdominal Surgery 10th edition - 1904” 95% of the patients have hyperamylasemia at presentation. Jacobs et al. (1977) reported that 90% of patients had raised serum amylase at time of presentation.

According to Matull et al. (2006), Vissers et al. (1999), and Keim et al., the sensitivity and specificity of serum amylase in acute pancreatitis was 55-84% and 95%, respectively. 19-32% of patients may have normal serum amylase level at time of admission according to Matull et al. (2006) and Clavien et al. In the present study, sensitivity and specificity of serum amylase is 15% and 71%, respectively.

In the present study, serum lipase was found to be elevated in 11 patients (27.5%) and normal in 29 patients (72.5%). The sensitivity and specificity of serum lipase in the present study is 64% and 96.2%, respectively. Chang and Chung and Lott et al. reported from their study that the sensitivity and specificity of serum lipase was 80% and 60%, respectively. At a cutoff level of 600 IU/l, the sensitivity and specificity of serum lipase was 55-100% and 95% respectively in study by Matull et al., (2006) and Back et al. (2002) which is similar to the present study. The mean level of serum lipase in gallstone pancreatitis. The mean level of serum lipase in gallstone pancreatitis is 315.15 ± 139.56 and non-gallstone pancreatitis is 609.71 ± 343.53.

In the present study, Ranson's score predicted that the attack will be mild in 23 patients (57.5%) and severe in 17 patients (42.5%) giving the sensitivity and specificity of 65% and 80% in predicting the severity in acute pancreatitis which is similar to study conducted by Fan et al. (1989). Area under the curve (AUC) of Ranson's score in our study is 0.795 (0.66-0.93). AUC in the study by Yadav et al. (2015) was 0.94.
Wilson et al. reported the sensitivity and specificity of Ranson's score as 87% and 71%, respectively. Balthazar et al. reported a sensitivity of 70% for Ranson's score in predicting the severity in acute pancreatitis. According to Larvin et al. (1989), Ranson's score correctly predicted the outcome in 69% of the patients. Khanna et al. reported sensitivity and specificity of 83.9% and 78%, whereas Papachristou et al. reported sensitivity and specificity of 84.2% and 89.8%, respectively, in their study.

APACHE-II score had a sensitivity and specificity of 70% and 85% at 48 h of admission in predicting the severity of disease in acute pancreatitis in our study. Wilson et al. reported that APACHE-II score has a sensitivity of 68% and specificity of 67% in predicting the severity in acute pancreatitis. Larvin et al. (1989) observed that APACHE-II score at admission predicts outcome in 77% of the patients similar to the present study. After 48 h it correctly predicts outcome in 88% of the patients compared with 69% for Ranson's score and 84% for Imrie score. Balthazar et al. reported a sensitivity of 70% for APACHE-II score in predicting the severity in acute pancreatitis. Khanna et al. reported sensitivity and specificity of 82.9% and 88.0%, Papachristou et al. reported sensitivity and specificity of 71.9% and 78%, respectively. Yadav et al. (2015) and Cho et al. reported AUC for APACHE-II 0.78, whereas in the present study, AUC is 0.913 (0.83-0.99). In our present study, APACHE-II shows specificity similar to Khanna et al.

According to Balthazar, APACHE-II score has a sensitivity and specificity of 56% and 72%, respectively, in differentiating interstitial and necrotizing pancreatitis. Fan et al. reported the sensitivity and specificity for APACHE-II score as 78% and 52%, respectively.

CECT was done in all patients in the present study and acute pancreatitis was graded according to Balthazar CT grading score and CTSI leads to increase in the sensitivity (88.25%) and specificity (95.7%) of predicting the severity of acute pancreatitis. Combined use of all the three parameters, that is, Ranson's score, APACHE-II score, and CTSI leads to increase in the sensitivity (88.25%) and specificity (95.7%) of predicting the severity of acute pancreatitis.

CONCLUSION

The most common presenting symptom is pain epigastrium associated with vomiting. Associated disease is present in 15 patients which included hypertension in 9 patients, diabetes mellitus in 2 patients, and both hypertension and diabetes mellitus in 4 patients. Acute pancreatitis is associated with biliary tract stone disease in majority of cases followed by alcoholism. Serum amylase levels are more sensitive but less specific for detection of acute pancreatitis, whereas serum lipase levels are more specific for detection of acute pancreatitis. Total leukocyte counts were raised in 70% of patients and deranged liver function test and renal function test present in 55% and 37.5% of patients, respectively. Ranson's score is less sensitive but more specific for predicting the severity of acute pancreatitis with sensitivity and specificity of 65% and 80%.

APACHE-II score is less sensitive and more specific (70% and 85%) for predicting the severity of acute pancreatitis. CECT showed a sensitivity and specificity of 75% and 95% in predicting the severity of acute pancreatitis. Combined use of all the three parameters, that is, Ranson's score, APACHE-II score, and CTSI leads to increase in the sensitivity (88.25%) and specificity (95.7%) of predicting the severity of the disease.

REFERENCES


**Source of Support:** Nil, **Conflict of Interest:** None declared.
Role of Different Topical Agents in Chronic Nonhealing Lower Limb Ulcers

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Abstract

Introduction: Chronic wounds mostly affect people over the age of 60. The incidence is 0.78% of the population and the prevalence ranges from 0.18% to 0.32%. As the population ages, the number of chronic wounds is expected to rise. Venous ulcers account for about 70-90% of chronic wounds.

Materials and Methods: This is a prospective, observational study to evaluate the safety and efficacy of RhPDGF-BB gel 0.01%, papain-urea and sodium hyaluronate cream in patients aged between 18 and 75 years with chronic leg ulcers.

Results: They are tabulated in proper format in various tables in manuscript.

Conclusion: Chronic nonhealing ulcers are of major concern to the society and the health-care system in terms of prolonged course of treatment and loss of productivity and work hours. Any alteration in the normal physiological pathway of wound healing leads to formation of a chronic wound, with a protracted course characterized by prolonged inflammatory phase and elevated protease activity resulting in impaired healing.

Key words: Chronic wounds, Diabetic ulcer, Growth factors, Non-healing

INTRODUCTION

A chronic lower limb wound is a wound that does not heal in an orderly set of stages and in a predictable amount of time the way most wounds do. Chronic wounds mostly affect people over the age of 60. The incidence is 0.78% of the population, and the prevalence ranges from 0.18% to 0.32%. As the population ages, the number of chronic wounds is expected to rise. Venous ulcers account for about 70-90% of chronic wounds.

Chronic nonhealing wounds are a challenge to the patients, as well as to the health-care professional and the health-care system. They significantly impair the quality of life for millions of people. Intensive treatment is required and imparts an enormous burden on society in terms of loss of productivity and man-hours. Therefore, the study of chronic nonhealing wounds is vitally important.

Chronic wounds are a frequently encountered problem that is produced by trauma or pathological insults. Characteristics of chronic wounds include a loss of skin of underlying tissue and do not heal with conventional types of treatment, with a responsible time period.

Any alteration in any of the normal physiological process or any metabolic or pathological attribute of wound or any metabolic or pathological attribute of wound healing can lead to the formation of a chronic wound.

Chronic wounds are characterized by a prolonged inflammatory phase, which ultimately results in elevated protease activity and the subsequent degradation of growth factors and the positive wound healing factors; overall effect is impaired healing.

Since chronic wounds express growth factors necessary for healing in deficient quantity, healing may be fastened by replacing or stimulating those factors and by preventing the excess formation of proteases that break them down.

There are several ways to increase growth factors concentration in chronic wounds like local applications/topical agents of growth factors directly or spread a gel of patient own platelets onto the wound, which then secrete...
growth factors such as vascular endothelial growth factors, insulin growth factors-1,2, platelet-derived growth factors (PDGF), transforming growth factors –β (TGF-β), and endothelial growth factor (EGF). The most studied growth factors are PDGF fibroblast growth factor, TGF-β, and EGF, FDA has approved the use of gel (PDGF) as an adjuvant therapy in diabetic ulcers. Early experimental studies have shown the potential of EGF in promoting wound healing. EGF clearly stimulates epidermal repair in animal excisional and thermal injury models and may also stimulates thickness under repair. Nanny, using a pig partial thickness wound model, reported a dose-dependent increase in thickness of granulation tissue epithelialization with EGF.

Various types of allogeneic skin substitutes including cultured epidermal substitute, cultured dermal substitute, cultured skin substitute, which are composed of keratinocytes and/or fibroblasts as cellular component have been used as biological wound dressings. Collagen films containing human growth hormone were prepared, and the release of human growth hormone from these films and their effects on wound healing was evaluated.

In this study, the different topical agents in chronic nonhealing lower limb ulcers used are sodium hyaluronate cream, papain-urea debriding ointment, recombinant human PDGF (RhPDGF), and silver nitrate gel.

**MATERIALS AND METHODS**

**Study Design**
This is a prospective, observational study to evaluate the safety and efficacy of RhPDGF-BB gel 0.01%, papain-urea and sodium hyaluronate cream in patients aged between 18 and 75 years with chronic leg ulcers.

**Study Centre**
Prathima Institute of Medical Sciences, Karimnagar.

**Study Duration**
The maximum and expected duration of exposure to the study for an individual subject in treatment and follow-ups up to 12 weeks or complete wound closure, whichever is earlier.

**Number of Subjects**
A number of subjects were 27.

**Informed Consent**
Informed consent is obtained from the patient with date. Subject information sheets are provided to the patients, which will be available in three local languages.

**Criteria for Selection of Patients**

**Inclusion criteria**
- The patient is able to understand and has signed the informed consent form. In the case of compromised mental capacity, approval and signature of a legal guardian are required.
- A diagnosed case of venous insufficiency both by clinical evaluation and any of the supporting diagnostic tests as objective evidence.
- The largest ulcer is no <2 sq.cm and no more than 50 sq.cm.
- Patients are expected to be available for the 12 week study period and are able to adhere to the treatment regimen.
- Patients, male or female patients between 18 and 75 years at the time of consent.
- If the patient is female, she must not be of childbearing potential (e.g., surgically sterilized) or if of childbearing potential, she must have used adequate contraceptive precautions (as confirmed by the investigation) 30 days before screening and baseline visit, or must be negative on pregnancy test and must agree to continue such precautions up to end of study.
- The pregnancy test will be done regularly on these patients if these are outdoor patients.
- Ulcers, which remained, open without healing for more than 2-3 weeks (irrespective of the ambulatory treatment administered).
- Ulcers with purulent discharge and nonviable tissue.

**Exclusion criteria**
- Life-threatening or serious cardiac failure gastrointestinal, hepatic, renal, endocrine, hematological, or immunologic disorder.
- Uncontrolled hypertension Grade-III.
- Squamous cell carcinoma and basal cell carcinoma of the wound.
- Known case of hypersensitivity to incipient.
- Pregnant women and nursing mothers.
- Past history of autoimmune disease.
- Chronic alcohol abuse (40 ml/day for at least 6 months).
- The patient is receiving or has received within 1 month before first visit any treatment is known to impair wound healing including but not limited to, corticosteroids, immunosuppressive drugs, cytotoxic agents, radiation therapy, and chemotherapy.
- Use of any marketed or investigational or herbal medicine or non-registered drugs for wounds in the past 6 months.
- Clinically relevant abnormal hematology or biochemistry values in the opinion of the investigator.
- Any criteria, which in the opinion of the investigator, suggest that the patient would not be complaint with the study.

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• Treatment with a dressing containing any other growth factors or other biological dressings within 30 days before the screening visit.
• Participation in another clinical study within 30 days before the screening visit or during the study.

Discontinuation criteria
During the study following events must be excluded from the study:

- A request by the patient to be discontinued from the study.
- The patient requires any treatment/therapy that would compromise the evaluation of the test product.
- The investigator feels that it is not in the best interest of the patient to continue the study.
- There is a lack of adherence to the study protocol.
- An adverse event occurs, whether or not treatment related, which precludes continued treatment.
- Any female patient who becomes pregnant during the course of study.
- If compliance (acceptable compliance - 85%) of the patient is found to significantly outside this range at
two consecutive visits, such subjects will be excluded from the efficacy analysis because of noncompliance to treatment.

**Ulcer Groups**

Ulcers are classified into 3 groups as follows:

**Group-I:**
- <5 sq.cm ulcer category patients after screening will be measured for ulcer size and patients having ulcer size.
- <5 sq.cm will be included in the group the subjects with no active infection are given RhPDGF, and ulcer with infection are randomly given Papaya - urease and sodium hyaluronidase.

**Group-II:**
- 5-10 sq.cm ulcer size category patients after screening will be measured for ulcer size and patients having ulcer.

**Group-III:**
- >10 sq.cm ulcer size category patients after screening will be measured for ulcer size and patients having ulcer size >10 sq.cm will be included in this group.

**Screening of Patients**

- Informed consent form for enrolment into study.
- Completion of checklist for inclusion, exclusion, and discontinuation criteria.
- Assigning a screening number.
- Recording of medical history, physical examination, and vital signs.
- Any concomitant medication recorded.
- Wound measurement is recorded.
- Wound swab test for estimation of microbial load is taken.
- Screening tests regarding hematology, biochemistry, and urine analysis are done.
- Advice regarding schedule next visit.
- Urine pregnancy test, if applicable.

Initially, the progress of ulcer is observed daily for 2 weeks, and the duration of observation is changed depending on the further progress of the ulcer. Initially, the wound swab test for the estimation of the microbial load is done every 3-4 days, after which the weekly schedule is followed.

**Products**

A. RhPDGF-BB gel 0.01% (RhPDGF - BB).
B. Papain-urea (debriding ointment and spray).
C. Sodium hyaluronate cream 0.2%.

**RESULTS**

- The mean age of the patient groups was around 50 years with a range between 31 and 60 years.
- Traumatic ulcers were common in the younger patients, diabetic ulcers in the older age group whereas vascular ulcers were common at all age groups (Tables 1-9).

**DISCUSSION**

A total of 27 patients were included in this prospective study in Prathima Institute of Medical Sciences, Naganur, Karimnagar to study about the role of different topical agents in chronic nonhealing lower limb ulcers.

All the patients in the study and control group were followed up for a maximum period of 8 weeks mainly record the rate of healing and the incidence of secondary infection.

The mean age in this study was 50 with a range between 30 and 60 years. Chronic nonhealing ulcers were more common in the 4-6th decades of life. 11 cases (40.74%) were vascular ulcers, 6 cases (22.22%) were chronic diabetic ulcers, and the remaining 10 cases (37.04%). All the patients were distributed equally for better results.

Chronic diabetic ulcers were common after the fourth decade of life, chronic vascular ulcers were more common in all age groups, and chronic traumatic ulcers did not show any age predilection.

There was complete healing of the ulcer in three patients (2 chronic vascular ulcers and 1 chronic traumatic ulcer) treated with RhPDGF-BB gel, Three patients with papain-urea (2 chronic post-traumatic ulcers and 1 vascular ulcer), and sodium hyaluronate cream applied to three patients (1 chronic vascular ulcer and 1 post traumatic ulcer) complete healing over the period of 8 weeks during which the study was conducted.

Chronic wounds may be associated with active infection, such as cellulitis. In addition, an occasional chronic wound may be the nidus for bacteremia and sepsis. In these cases, administer systemic antibiotics. Alternatively, the wound itself may be infected, without systemic effects. Take steps to lower the bacterial count of these wounds, including topical methods to encourage wound healing. Topically applied growth factors are meant to assist the chronic wound with establishing healthy granulation tissue or epidermal cell function for improved healing.
Several growth factors have been studied to this end. Platelet-derived growth factor has been shown to reduce the size of chronic ulcers by up to 70%, as compared to 17% for placebo, probably via acceleration of provisional wound matrix deposition. EGF supplementation was associated with healing of 8 of 9 wounds. Removing dead tissue and thinning the pus in lesions such as ulcers, burns, wounds, and carbuncles.

RhPDGF-BB gel 0.01% is a topically applied growth factor for the healing of the chronic diabetic foot ulcers. RhPDGF-BB gel activates macrophages, fibroblast and growth factors, induces cell proliferation stimulates angiogenesis, and stabilizes newly formed blood vessels. RhPDGF is designed to mimic the naturally occurring PDGF that is present in the body. RhPDGF activates the healing process and helps in complete wound closure.

Papain-urea ointment is a debriding agent. It works by helping the breakdown of dead skin and pus, which helps improve the recovery time of open wounds. Sodium hyaluronate cream correction of cellular dysfunction, restoration of biochemical balance, adequate blood perfusion, control of bacterial load and activates the healing process and helps in complete wound closure.

Although several growth factors have been currently explored as potentially wound healing agents, RhPDGF and TGF-β are the widely used growth factors in healing of various ulcers. Although PDGF is the only FDA approved growth factor.

This study conducted on 27 patients with chronic lower limb ulcers (vascular, traumatic, and diabetic ulcers) observed for a maximum period 12 weeks for any appreciable results. Results of the study suggest that the RhPDGF-BB, papain-urea, and sodium hyaluronate cream agents are increases the percentage of complete healing of ulcers. These type of topical agents are excellent safety and easy to apply.

**CONCLUSION**

Chronic nonhealing ulcers are of major concern to the society and the health-care system in terms of prolonged course of treatment and loss of productivity and work hours. Any alteration in the normal physiological pathway of wound is healing leads to formation of a chronic wound, with a protracted course characterized by prolonged inflammatory phase and elevated protease activity resulting in impaired healing.

Ulcer healing can be poor with up to 50% of venous ulcers turning into nonhealing ulcers. Ulcer recurrence rates are also common with up to one-third of these patients being treated for a recurrence. Chronic venous ulcers of lower extremities are associated with negative impact on the quality of life of patients, and they also cause a substantial burden on the monetary resources. Prevention strategies, early identification and proper management are of paramount importance in improving the quality of life and reducing health care costs.

With advancing times, many new products were developed in the management of chronic wounds, such as hydrocolloids, calcium alginites, impregnated films, recombinant growth factors, and allogeneic skin substitutes, but the management of chronic wounds still remains an enigma, with a search for a better product that assists through all the phases of wound healing.

In this study RhPDGF, papain-urea and sodium hyaluronate cream as resulted in a faster rate of wound healing and reduced incidence of secondary infection has necessitating fewer dressings and facilitating early return to work.

Although RhPDGF, papain-urea and sodium hyaluronate cream are not more expensive, removing dead tissue and thinning the pus in lesions such as ulcers, burns, wounds, and carbuncles. These are also works by helping the breakdown of dead skin and pus, which helps improve the recovery time of open wounds, in the long run, the need for fewer dressings, reduced secondary infection needing fewer antibiotics, shortened duration of treatment and consequential early return to work prove ultimately to be more economical.

Thus, the overall advantages of the products (RhPDGF, papain-urea, and sodium hyaluronate cream) make this a better alternative in the treatment of chronic nonhealing ulcers.

**REFERENCES**


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Cardiovascular and Electrocardiography Changes in Obese Individuals at Rest and During Stress Test

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ABSTRACT

Background: The possible relation between obesity and cardiovascular disease (CVD) has been subject of great controversy. The relationship between the degree of obesity and incidence or CVD was stressed by study of obesity as an independent risk factor for CVD.

Objective: The objective of the study was to see the cardiovascular findings in obese individuals at rest and during treadmill stress testing (ST) (TMT) and to see the effort tolerance of obese individuals using TMT.

Methods: This study was conducted in tertiary care hospital during a period of 1 year and it included a total of 50 adult obese patients on the basis of criteria for obesity being body mass index of more than 30.

Result: Out of which 50 obese, 12 (24%) were positive for ischemic heart disease, 18 (36%) diabetic, 23 (46%) were chronic smoker, and 31 (62%) had hypercholesterolemia. The cardiovascular findings were tachycardia 9 (18%) and The ischemic response: Significant ST-segment depression was found in 9 (18%). All these findings suggested that left ventricular function was abnormal, and persons were prone to develop ischemic or infarction.

Conclusion: This study helps us to rehabilitate and educated the cases of obesity. The obesity associated with the presence of risk factors promotes the incidence of CVD. The incidence increases in obese individuals with multiple risk factors more as compared to those with single risk factors. Reduction of weight and control of risk factors such as diabetes, cholesterol, alcohol, and smoking may contribute to lower the incidence of CVD.

Key words: Body mass index, Cardiovascular, Electrocardiography, Obesity, Stress test

INTRODUCTION

Obesity is a common nutritional disorder in our societies. It significance requires constant emphasis because it is associated with increased mortality, predispose to the development of important diseases, and diminish the efficiency of those affected.

Excess deposition of adipose tissue is obesity. However, it is difficult to decide what should be labeled as excess. Comparison of weight (adjusted to height) with that of the mean derived from population studies can be taken as simple criteria.

In India, the table used may be those derived from the study of people because our average would be different from that of western countries.

Another set of average is derived from knowledge of the effect of weight on longevity. The range associated with highest life expectancy is called ideal weight.

Weight of persons 20% above the ideal weight substantially increases the rate of morbidity and mortality.

The incidence of obesity is proportional to the availability of food for excess consumption. Hence, the incidence of obesity would be higher in developed countries or among people belonging to higher economic strata in countries like India.
The higher degree of health awareness may modify this statement.

Obesity usually is defined as the presence of an abnormally large amount of adipose tissue. When the amount adipose tissue is very large, the diagnosis is labeled “Morbid obesity.”

Adipose tissue mass is difficult to measure clinically however and the precise cut off between normally and obesity has been a subject of debate in years.

The recent recognition that the pattern of distribution of adipose tissue throughout the body affects metabolic consequences and may be more important factor than total adipose tissue mass thus a person with fat located predominantly in the abdominal region may be at greater risk of hypertension, heart diseases, and diabetes mellitus than another individual with a greater total amount of adipose tissue that is located predominantly in gluteal region.


**Determination of Body Fat and Its Distribution**

There are several laboratory methods for measuring body fat, but none of these is widely available for clinical use.

**Weight and Height**

The most commonly anthropometric measure in obesity clinics and medical practice are weight and height. They have the advantages of wide availability of equipment, ease, and accuracy of use general acceptability to patients; in fact, the most patients define obesity on the basis of body weight. The basic problem with these measures is that body weight is strongly correlated with body height and for this reason, not a good measure of body fat.

Studies have shown that the body mass index (BMI) related closely to body fat while being quite independent of height.

Gossow and Webster recently have suggested that the BMI actually is a measure of body fat related to height rather than percent of body and that this is better measure of obesity than percentage body fat.

Although the calculation of BMI is more complex than that of relative weight, its interpretation possibly is simpler once BMI is calculated; therefore, it can be related to a single set of easily memorized standards. For this reason, as well as its strong correlation with body fatness and increasing use of epidemiological studies, recommend the routine use of BMI.

Simple measurement of weight does not give very useful information. If weight is adjusted to height and age and compared with desirable weight derived from longitudinal population. Studies it can give a very good idea about obesity.

Individual with 20% above the ideal weight can be diagnosed as obese.

Obesity exists when adipose tissue makes up greater than “Normal” fraction of total body weight. In male subjects aged 8 years, approximately 15-18% of body weight is fat.

The corresponding figures for females are 20-25%.

The percentage of body weight that is fat usually increases with age this may not be necessary or desirable.

Body fat content >28% of total body weight for men and >30% for women is obesity.” The problem with this definition is that body fat is difficult to measure in the clinical setting.

**MATERIALS AND METHODS**

This study is conducted in Department of General Medicine, Tertiary Care Hospital in Mumbai during a period of 1 year. This study included a total of 50 obese patients.

**Criteria for Selection of Patients**

1. On the basis of criteria for obesity being BMI more than 30.
2. Obese individuals of age between 20 to 70 years were selected.

**Exclusion Criteria**

Contraindication to stress testing (ST) and conditions which could interfere with results, patients belonging to these groups is excluded from the study:

1. History of recent myocardial infarction (in last 6 months)
2. Presence of signs and symptoms of CCF
3. Fresh changes in ECG
4. Hypertension
5. Various conduction block
6. Any congenital heart disease
7. Suspected cases of ventricular aneurysm
8. Myocarditis, pericarditis, pericardial effusion
9. Chronic corpulmonale
10. Severe anemia (Hb <5 g %)
11. Acute noncardiac illnesses
12. Musculoskeletal abnormalities.
Method
A total of 50 obese individuals were included in the study. A pro forma was prepared which included detailed history, clinical examination, and requisite investigations.

RESULTS
This study is conducted in Department of General Medicine, Tertiary Care Hospital in Mumbai. This study included a total of 50 obese patients (Tables 1-14).

DISCUSSION
Obesity is an independent risk factor for cardiovascular disease (CVD). This relationship between degree of obesity and the incidence of CVD has been proved by many studies. This relation was reexamined in male and female of original Framingham Cohort, recent observation of disease occurrence over 26 years indicate that obesity is a significant independent predictor of CVD.32

Obesity is directly related to an increased risk profile for atherogenesis, i.e., it has been associated with increased blood pressure, hyperlipidemia, glucose intolerance, and hyperinsulinemia.46

Obesity increases the work done by heart which enlarges with rising body weight. Cardiac output, stroke volume and blood volume all increases. Hypertension is also common. It is difficult to separate the contribution of obesity from that of other risk factors such as diabetes, hypertension, hyperlipidemia, smoking, alcohol, and physical inactivity.

Keeping the above facts in view a study of cardiovascular and ECG findings in obese at rest and using tread mill ST (TMT) has been done in the Department of General Medicine, Tertiary Care Hospital, Mumbai.

Although it was decided to select the cases from groups with other risk factors and without other risk factors, in spite of our meticulous efforts, we could not find any single obese individual having no other risk factor hence results of other studies assessing effort of risk factors other than obesity on incidence of heart disease were reviewed and compared with our study.

Age and Sex Incidence in Obese
In our study, a total number of 50 obese individuals have been selected with criteria of BMI more than 30.

Out of total 50 cases, 34 (68%) obese were male and 16 (32%) were female.

<table>
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<tr>
<th>Parameter</th>
<th>BMI (kg/m²)</th>
<th>Risk of comorbidities</th>
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<tr>
<td>Underweight</td>
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<td>Low</td>
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<td>Healthy weight</td>
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<td>Average</td>
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<td>Severe</td>
</tr>
<tr>
<td>Obesity class 3</td>
<td>&gt;40</td>
<td>Very severe</td>
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</table>

Obesity: Preventing and managing the global epidemic, 2000, WHO, Geneva, BMI: Body mass index

<table>
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<th>Male</th>
<th>Female</th>
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<th>Total female obese</th>
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<thead>
<tr>
<th>Number of cases (%)</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 (96)</td>
<td>30-39 (Obese)</td>
</tr>
<tr>
<td>2 (4)</td>
<td>40 and above grossly obese</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Number of case (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old IHD</td>
<td>12 (24)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>18 (36)</td>
</tr>
<tr>
<td>Smoking</td>
<td>29 (58)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>18 (36)</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>31 (62)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Abnormal cardiovascular findings</th>
<th>Total cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>-</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Murmurs systolic (Functional)</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2 (4)</td>
</tr>
</tbody>
</table>

There were 41 (82%) obese of age between 31-50 years. One obese was 22 years old and rest of 8 (16%) were of more than 51 years.
Table 7: Abnormal cardiovascular findings in obese individuals during TMT

<table>
<thead>
<tr>
<th>Abnormal cardiovascular findings</th>
<th>Total Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>-</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>50 (100)</td>
</tr>
<tr>
<td>Murmurs systolic (functional)</td>
<td>-</td>
</tr>
<tr>
<td>Hypertensive response</td>
<td>46 (92)</td>
</tr>
<tr>
<td>Hypotensive response</td>
<td>400 (8)</td>
</tr>
</tbody>
</table>

TMT: Treadmill stress testing

Table 8: Cardiovascular status of obese individuals according to functional class

<table>
<thead>
<tr>
<th>Stage or grade</th>
<th>Mets unit</th>
<th>Number of cases (%)</th>
<th>Functional class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0 (Warmup)</td>
<td>&lt;3</td>
<td>10 (20)</td>
<td>IV</td>
</tr>
<tr>
<td>Stage I</td>
<td>4.8</td>
<td>18 (36)</td>
<td>III</td>
</tr>
<tr>
<td>Stage II</td>
<td>6.8</td>
<td>18 (36)</td>
<td>II</td>
</tr>
<tr>
<td>Stage III</td>
<td>9.6</td>
<td>2 (4)</td>
<td>I</td>
</tr>
<tr>
<td>Stage IV</td>
<td>13.2</td>
<td>2 (4)</td>
<td>I</td>
</tr>
<tr>
<td>Stage V</td>
<td>16.1</td>
<td>-</td>
<td>Normal</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Symptoms and signs during in obese individuals

<table>
<thead>
<tr>
<th>Symptoms/signs</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest pain</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Giddiness</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Syncope</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Leg cramps</td>
<td>5 (10)</td>
</tr>
<tr>
<td>Breathlessness</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>0 (0)</td>
</tr>
<tr>
<td>ST depression&gt; 2 mm</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Abnormal blood pressure</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>-</td>
</tr>
<tr>
<td>Hypotensive</td>
<td>4</td>
</tr>
</tbody>
</table>

TMT: Treadmill stress testing

Table 10: Results of and reasons for terminating the test

<table>
<thead>
<tr>
<th>Reason for termination of test</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST-T. changes (Ischemic response )</td>
<td>11 (22)</td>
</tr>
<tr>
<td>Achievement of 100% target heart rate</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Development of symptoms and signs</td>
<td>10 (20)</td>
</tr>
</tbody>
</table>

TMT: Treadmill stress testing

These data are in the favor of the fact that obesity usually occur in the middle age.

Preble et al. found the maximum incidence in the age group of 41-50 years. Patel found the maximum incidence in the age group of 31-40 years.

Incidence of Ischemic Heart Disease (IHD) and Relation with Obesity

In this study, the incidence of IHD was total 25%. It is well-known fact that IHD incidence increases with weight
of individual in the presence of risk factors. As the weight increases, the incidence of IHD also increases.

Keys et al.\textsuperscript{5} say the relationship between the relative weight and of skin fold thickness to the 5 years incidence (632) cases of coronary heart disease was examined in man 40-59 years of age. At entry to the study United States Railroad man, 2439 men in Northern Europe and 6579 men in Southern Europe were studied of all men studied 22.3% had a BMI 27 or more at the entry and therefore were labeled as relatively heavy men. In this category, coronary heart disease was 29% of the Americans, 23.1% of Southern Europe.\textsuperscript{5}

**Obesity and Diabetes**

In this study, the incidence of diabetes was 37% and incidence of IHD in this group 73%.

Diabetes is a primary risk factor for incidence of increased atherosclerosis and IHD. From the Framingham study, Gordon et al.\textsuperscript{31} in known diabetic, in both noninsulin-dependent diabetes mellitus (NIDDM) and IDDM, there is at least two-fold increase in incidence of coronary artery disease.\textsuperscript{31}

**Obesity and Hypercholesterolemia**

Hypercholesterolemia is also a well-documented primary risk factor for coronary heart disease. When it is associated with other risk factors, it accounts for higher incidence. In this study, value of serum cholesterol is found to be high in 62% of total obese individual.

**Obesity and Smoking**

In this study, 29 obese individuals were chronic smokers. They all were giving the history of smoking for more than 10 years and 10-15 sticks per day. Out of the above 40% of chronic smokers, the effort tolerance was poor in all cases and the positive response for IHD was present in 6 cases. It is well-known fact that smoking produces adverse effects on coronary vessels and if associated with other risk factor their incidence of coronary heart disease increases.

The frequency of episodes of ischemia was 3 times greater and duration of ischemia 2 times longer in smokers than in nonsmokers. Barry et al. (1989).

**The Cardiovascular and ECGs Findings in the Present Study was as Follows**

In this study tachycardia in 9 cases (19%), remaining 41 individuals had normal pulse rate. During TMT, all obese had increased heart rate (normal response).

Hypotensive response in 4 (8%) individuals. There was functional murmur present in 3 individual at rest.

Electrocardiographic findings were corresponding with clinical cardiovascular findings in all obese individuals. In this study, 41 (82%) obese had normal heart rate and tachycardia was in 9 (19%) individuals.

Ventricular ectopics (VPC’s) were present in 5 individuals.

Left axis deviation was present in 4 individuals. Left ventricular hypertrophy (LVH) in 6 (12%) cases.

The finding of old typical myocardial infarction was present in 6 (12%) individuals. The finding of T-wave abnormality was present in 9 (18%) individuals.

St. Segment abnormality which was 0% at rest in obese individuals became 23% during ST.

Out of 15 obese individuals who were positive for IHD, 6 (12%) had down sloping type of depression (reported as strongly positive) and 3 (6%) had horizontal. VPC’s disappeared in 5 individuals possibly due to overdrive suppression of impulse. In 2 obese individual, T-wave which was inverted at rest became positive during ST which was sign of ischemia and test was considered to be positive for IHD.

Franks et al.\textsuperscript{27} have done statistical analysis of 1.029 electrocardiograms in obese subjects. The heart rate, PR-interval, QRS duration, QTc interval and voltage increase and QRS vector shifted to left with increasing obesity. These changes were independent of age, sex, and blood pressure. Bradycardia was present in 19% of patients but tachycardia in only 0.5%.\textsuperscript{27}

The ST and T abnormalities were present in 2% correlating better with severity of obesity. The heart rate and QRS voltage increases with increasing obesity.

Wilson et al.\textsuperscript{51} (1991) determined the relationship of regional fat distribution and obesity to electrocardiographic parameters in healthy premenopausal women.\textsuperscript{51}

They found that intra-abdominal fat was significantly associated with prolongation of QTc interval and susceptibility of cardiac arrhythmia.\textsuperscript{51}

In our study, we found that QTc prolongation was not seen.

An epidemiological study of urban population of Delhi (Chadha et al.\textsuperscript{16}) was carried out in persons with history of obesity and hypertension and smoking. The obtained data form a sample of 13723 adults suggested that hypertension had strong association with obesity, diabetes, smoking, and family history were also found to be associated with IHD.\textsuperscript{16}
In the TMT response in the present study, we found that a total of 15 (30%) obese individuals were positive for IHD. There was depression of ST segment more than 2 mm. In 6 (12%) cases, there was strongly positive response for IHD.

In 3 (6%) obese individual, the ST segment depression was horizontal. Effort tolerance in all these individuals was impaired and poor. In 2 (4%) obese individuals, the effort tolerance was good and test was negative for exercise inducible ischemia and symptoms and signs were less significant and there was achievement of target heart rate (THR).

The point common in group which achieved THR was that they had only one additional risk factor, i.e., family history.

In 10 (20%), the reasons for terminating the test were development of symptoms and signs.

The effort tolerance was impaired in 46 (92%) which is common in obese individuals.

CONCLUSION

In this study, cardiovascular and ECG findings in obese individuals at rest and by using TMT were studied and recorded.

In our study, 50 obese individuals were selected with BMI more than 30. 82% of obese individuals were in between 30 and 50 years of age. Out of which 50 obese, 12 (24%) were positive for IHD, 18 (36%) diabetic, 23 (46%) were chronic smoker, and 31 (62%) had hypercholesterolemia. The cardiovascular findings were tachycardia 9 (18%) and systolic murmur 3 (6%). When these cardiovascular findings were compared with ST, there was hypotensive response in 48 (8%).

The ischemic response: Significant ST segment depression was found in 9 (18%). All these findings suggested that left ventricular function was abnormal and persons were prone to develop ischemic or infarction.

The electrocardiographic findings were correlated with cardiovascular findings and changes occurred during ST.

The ventricular premature contractions were present in 5 (10%) at rest and no VPC’s during exercise. Disappearance of VPC’s is likely to be due to overdrive suppression of ectopic impulses.

In resting ECG, the findings suggestive of LVH was found in 6 (12%) and old myocardial infarction in 6 (12%). T-wave abnormality in 9 (18%). T-wave which was inverted in resting ECG became positive during TMT in 2 cases which were suggestive of ischemia.

All bases persons were subjected for their serum cholesterol estimation and it was found to be significantly increased. There is strong evidence that IHD is common in obese individuals than persons having normal weight and height for that particular age, cholesterol may be an important common factor.

The effort tolerance was found to be very poor in 20% of obese individual in whom before producing ST changes during ST having sense of rotation, giddiness and heaviness or chest pain are also positive if they could have continued with exercise (inconclusive test).

This study helps us to rehabilitate and educated the cases of obesity.

The obesity associated with presence of risk factors promotes the incidence of CVD. The incidence increases in obese individuals with multiple risk factors more as compared to those with single risk factors.

Reduction of weight and control of risk factors such as diabetes, cholesterol, alcohol, and smoking may contribute to lower the incidence of CVDs.

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Analysis of the Outcome of Mandible Fracture Management

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Abstract

Introduction: The mandible is the second most common facial fracture, with the nasal bone being the first. Knowledge of the anatomy of the mandible and the muscular forces applied to it is the key to proper reduction of mandibular fractures. The goal in reduction is to restore premorbid occlusion, allowing patients to resume masticatory functions.

Aim: The aim of this study is to analyze the outcome of mandibular fracture fixation with eyelets, arch bars, miniplates, and screws.

Methods: A total of 67 patients who reported to the trauma ward and the department of plastic and reconstructive surgery for the treatment of fracture mandible were included in this study. Information was collected from the clinical and surgical notes of each of the patients in a standardized and systematic pattern.

Results: Of the 15 patients treated conservatively, 11 (73.3%) had single fracture and 4 (26.6%) had double fractures. In the surgically treated patients, 30 (57.6%) had single fracture, 17 (32.6%) had double fractures, and 15 (28.8%) had segmental fractures. In the conservative group, the visual analog score for chewing improved from 9 to 6 in 6 weeks’ time, and in the surgical group, the score improved in 4 weeks’ time since we removed maxillomandibular fixation soon after surgery. The mouth opening becomes near normal (45-50 mm) in single fractures both in conservative and surgical groups. In double fractures of both the groups, the mouth opening was 40-45 mm in 6 weeks’ time.

Conclusion: An adequate knowledge of the diagnosis and management of various types of mandibular fracture is needed so as to provide the desired treatment to prevent unfavorable and adverse complications.

Key words: Closed reduction, Facial trauma, Mandible, Maxillofacial, Maxillomandibular fixation, Occlusion, Plating

INTRODUCTION

The face is the most admirable part of our body. Facial injury is the most common cause of disfigurement and affects the personality of the individual very much. The most frequently injured facial bone is mandible after the nasal bone because it is the most mobile and prominent facial bone.¹ Mandible fractures are a frequent injury because of the mandible’s prominence and relative lack of support. As with any facial fracture, consideration must be given for the need of emergency treatment to secure the airway or to obtain hemostasis if necessary before initiating definitive treatment of the fracture.² The mandibular fractures outnumber zygomatic and maxillary fractures by a ratio of 6:2:1, respectively.³ Fractures of mandible invariably produce malocclusion if not treated properly. Knowledge of the dentition is thus an absolute prerequisite for the proper treatment of jaw fractures. Various techniques that are advocated in the literature to manage mandibular fractures vary ranging from bandages and external appliances, extra- and intra-oral appliances, monomaxillary wiring, intermaxillary wiring, plates, and screws.⁴ Restoration of the occlusion usually indicates anatomic reduction and proper positioning of the mandible and facial bones.
Our goal should be restoration of the function without any morbidity at the earliest.

**Aim**

The aim of this study is to analyze the outcome of mandibular fracture fixation with eyelets, arch bars, miniplates, and screws.

**MATERIALS AND METHODS**

This study was conducted in the Department of Plastic and Reconstructive Surgery, Coimbatore Medical College and Hospital. A total of 67 patients who reported to the trauma ward and the Department of Plastic and Reconstructive Surgery for the treatment of fracture mandible were included in this study. Information was collected from the clinical and surgical notes of each of the patients in a standardized and systematic pattern. The demographic variables, such as age, gender, and residence, were assessed. Clinical information included diagnosis and etiology, and anatomical distribution of mandibular fractures was assessed. The mandibular fractures were classified according to the sites such as the ramus, condyle, coronoid symphysis, body, para symphysis, and angle. Inclusion criteria were all adult patients between 25 and 55 years, patients reporting within first 7-10 days from the day of trauma, dentulous/partially edentulous patients, and patients giving consent for a follow-up period of 3 months postoperatively. Exclusion criteria were compound fractures, patients with other facial bone fractures, patients with systemic/debilitating diseases, and patients with head injury. Clinical evaluation includes history of incident, inspection-swelling, laceration, malocclusion, sublingual hematoma, deformity and trismus, palpation-step deformity/tenderness, paresthesia/dysesthesia/anesthesia of mental nerve, and TMJ examination to find any condyle fracture. All patients with suspected mandible fracture were subjected to orthopantomogram and computed tomography facial bones. The mandibular fractures were classified according to the site such as the ramus, condyle, symphysis, body, parasymphysis, and angle.

**RESULTS**

A total of 67 patients who underwent treatment for both conservatively and surgically were included in the study. The number of patients in the conservative group was 15 and surgically treated was 52. In this study, both in conservative and surgical majority of the injured patients were in the age group between 25 and 30 (42.6%). The youngest patient was 25 years and the oldest was 54 years. About 55 patients (82%) were in the age group of 25-40 years (Table 1).

Of the 15 patients treated conservatively, all were male, and in the 52 patients treated surgically, 43 were male (82.6%) and 9 were female. Road traffic accident (RTA) was the most common mode of injury in both conservative and surgically treated patients, which was followed by fall and assault. RTA was about 76.6% in both the groups (67 patients).

Of the 15 patients treated conservatively, 11 (73.3%) had single fracture and 4 (26.6%) had double fractures. In the surgically treated patients, 30 (57.6%) had single fracture, 17 (32.6%) had double fractures, and 15 (28.8%) had segmental fractures (Graph 1). In single fracture, right side (58.5%) was the most frequently involved. In both the groups, parasymphysis (48%) was the most common site of involvement in single fracture. The combinations in conservative double fractures were parasymphysis with subcondylar and bilateral parasymphysis fracture. In surgically treated double fractures the following were the combinations, bilateral parasymphysis - 6, parasymphysis with angle - 4, parasymphysis with body - 4, parasymphysis with ramus - 2, and parasymphysis with subcondylar - 1. Bilateral parasymphysis was the most common fracture. All the combinations had parasymphysis fracture. There were 5 cases of segmental fracture. Of which bilateral parasymphysis with one side subcondylar - 2, bilateral subcondylar with one side parasymphysis - 2 and bilateral parasymphysis with bilateral subcondylar fracture - 1 (Figure 1).

In the patients treated conservatively, maxillomandibular fixation (MMF) done within 24-48 h. If the patients surgically treated, patients were operated in an average period of 7 days (Graph 2).

Out of the 52 patients treated surgically, 43 patients underwent intraoral approach, 3 patients underwent extraoral approach (Figure 2) (Risdon approach), and 6 patients underwent both the approaches. (Graph 1) In both single and double fractures treated conservatively, the prefixation score of 9 improved to 1 by the end of 5 weeks in single fractures, but it took one more week in double fracture (Graph 3). In surgically treated patients (single, double, and segmental fractures), the results were same as conservatively treated single and double fractures, but

**Table 1: Age distribution of mandible fractures**

<table>
<thead>
<tr>
<th>Age</th>
<th>Conservative</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-30</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>31-35</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>36-40</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>41-45</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>46-50</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>51-55</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>52</td>
</tr>
</tbody>
</table>
the pain score was remaining high in the second and third weeks. In the conservative group, the visual analog score for chewing improved from 9 to 6 in 6 weeks’ time, and in the surgical group, the score improved in 4 weeks’ time since we removed MMF soon after surgery. The mouth opening becomes near normal (45-50 mm) in single fractures both in conservative and surgical groups. In double fractures of both the groups, the mouth opening was 40-45 mm in 6 weeks’ time.

Angle Class I occlusion was achieved in 13 patients (86.6%) in conservatively treated patients and 49 patients (94.2%) in surgically treated patients. There were 2 cases of open bite (13.3%) in conservatively treated patients and 3 cases of open bite (5.7%) in surgically treated patients (Table 2).

**DISCUSSION**

The mandible although considered the heaviest and the strongest facial bone, is more prone for fractures because it is an open arch, located in the lower portion of the face and atrophies with age. Facial injuries not only involve soft tissues but also damage the bone, leading to fractures. The mandible is connected by the strong muscles for various functions. They act as a splint and give protection to the mandible, and on the other hand, these powerful muscles...
can cause massive displacement of the fracture fragments.\textsuperscript{5} The human face constitutes the first contact point in several human interactions, and thus, injuries and mutilation of the facial structures may have a disastrous influence on the affected person.\textsuperscript{6} Knowledge of the dentition is thus an absolute prerequisite for the proper treatment of mandible fractures. Fractures of the mandible invariably produce malocclusion if not treated properly. The most common facial fractures were the mandible (61%), followed by the maxilla (46%), the zygoma (27%), and the nasal bones (19.5%).\textsuperscript{7,8} Road traffic injury was the most common mode of injury in our study (76.6%) followed by fall and assault. Adekeye has reported that 74% of mandibular fractures were due to RTA.\textsuperscript{9} This was also reported by Subhashraj et al. in a study done in South Indian city.\textsuperscript{10} The mechanism of hyperextension and hyperflexion of the head in traffic accidents makes it more vulnerable to fracture.\textsuperscript{11} This male predominance may be due to the greater mobility of the male and their aggressive behavior. In our study, we found that the age group between 25 and 30 years was the most commonly involved. This was supported by Ajmal et al.\textsuperscript{4} and Sirimaharaj et al.\textsuperscript{10} There were 61.6% of single mandibular fractures and 40.6% of multiple mandibular fractures, with an average of 1.34 fractures per person. This is similar to that of Sirimaharaj et al.\textsuperscript{10} who reported 1.4 fractures per person. Ajmal et al.\textsuperscript{4} reported 1.5 fractures per person. Parsymphysial fractures were the most common fractures in our study followed by the body and angle. Among double fractures, the most common combination is bilateral parasymphysis. In segmental fractures, bilateral parasymphysis fracture was the most common one. Right-side involvement was common. Ajmal et al.\textsuperscript{4} also reported that parasymphysial fractures were the most frequently involved followed by the body and angle. This was also supported by Mittal et al.\textsuperscript{12} study. Deranged occlusion followed by bony deformity was the most common mode of clinical presentation. This finding was supported by Laurentjoye et al.\textsuperscript{13} All the parasymphysis, symphysis, and body fractures were approached intraorally. Extraoral approach was used for angle fractures. Care was taken not to injure the mental nerve during intraoral and marginal mandibular nerve during Risdon approach. In our study, undisplaced fractures, condylar, and subcondylar fractures were treated with MMF, with good functional results as comparable with Ghodke.\textsuperscript{14} Out of 67 patients, 15 (22.3%) underwent conservative treatment with eyelets, arch bars, and MMF. The duration of MMF was 4-6 weeks in adults, 2-3 weeks in condylar fractures. \textsuperscript{4} Benjamin et al.\textsuperscript{15} study from Nigeria have also reported the usage of arch bars and eyelets with the same results. The average recommended period of immobilization of fractured mandible is 4-6 weeks.\textsuperscript{16,17} Although this is only empirical, it is usually influenced by several factors such as age of patient, type, number and severity of fracture, presence or otherwise of retained teeth in fracture line, and presence or absence of infection amongst others.\textsuperscript{12} In both the conservative and surgical single fracture patients, the visual analog score - pre-operative pain score of 9 - has come down to 1 during 5\textsuperscript{th} week. In surgical group, the pain score was remaining high in the 1\textsuperscript{st} week due to surgical trauma and then it has reduced to 2 during the 3\textsuperscript{rd} week due to stability of fixation. In surgical double fracture, the pre-operative pain score of 9 has come down to 1 in 5 weeks. However, it took 1 more week for the conservative double

<table>
<thead>
<tr>
<th>Complications</th>
<th>Conservative</th>
<th>Surgical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malocclusion</td>
<td>2 (13.3)</td>
<td>4 (7.6)</td>
</tr>
<tr>
<td>Infection</td>
<td>0</td>
<td>5 (9.6)</td>
</tr>
<tr>
<td>Nonunion</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Malunion</td>
<td>1 (6.6)</td>
<td>0</td>
</tr>
<tr>
<td>Paresthesia - Mental nerve involvement</td>
<td>2 (13.3)</td>
<td>4 (7.6)</td>
</tr>
<tr>
<td>Marginal mandibular nerve involvement</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Hardware exposure</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Graph 3: Visual analog score for pain

Table 2: Distribution of complications
fracture to come down to one. In conservative group, the pre-operative chewing score improved from 9 to 0 in 10 weeks. In the surgical group, it improved from 9 to 0 in 4-6 weeks. After removal of the MMF (6 weeks) in the conservative group and in the 3rd post-operative week in the surgical group, patients were encouraged to do early physiotherapy. They had impairment in speech also in the conservative group. At the end of 3 months, none of the patients had mastication and speech problem, which was comparable with Shivani et al. The average mouth opening was 41.5 mm in the conservatively treated group and 47 mm in the surgically treated group. This was probably due to the TMJ dysfunction in the conservatively treated group in whom MMF was retained for 4-5 weeks. This was comparable with studies conducted by Amarathunga and Cawood et al. This probably due to the muscle disuse atrophy and scarring in the fracture site following tissue disruption and hematoma formation. Near normal opening in the surgical group due to MMF removal after surgery and early mobilization. There were weight loss, airway-related problem, difficulty in phonation, and poor oral hygiene in the conservatively treated group. Weight gain and good oral hygiene were seen in the surgically treated patients. This study was similar to that of Brown et al. who demonstrated the advantages of miniplate osteosynthesis over intermaxillary fixation in management of fractured mandible. The post-operative function is improved and there was weight gain. Patients treated with intermaxillary fixation have restricted airway. There was weight loss during the first postoperative week in surgically treated patients. This was probably due to the poor intake of proper diet due to surgical trauma.

A total of 2 patients (13.3%) had malocclusion in the conservative group, which was noticed in the first review and they were subjected to open reduction. There was malocclusion in 4 patients (7.6%) who were treated surgically which was less when compared with the Benjamin et al. study. All the 4 patients were subjected to redo and occlusion was achieved. There were 5 cases of infection (9.6%) in the operated group which was treated with higher antibiotics, and the implant was retained till the fracture union. Implant removal was done in all these 5 patients after the fracture union. The infection rate was little higher when compared to Ugboro et al. who had 8.1%. 1 patient who was treated conservatively developed malunion and it was corrected with osteotomy, bone graft, and plate osteosynthesis. The neurological deficit in the operated group was 4 (7.6%) and the conservative group was 2 which was comparable to the study conducted by Benjamin et al. and Cawood et al. (8%) which improved in 6-8 weeks’ time. This deficit was not due to the surgical procedure but related to the nature of injury.

**CONCLUSION**

The treatment of mandible fractures requires adequate fracture reduction and stabilization through a closed or open technique. Success relies on the restoration of normal dental occlusion and bony union. The treatment chosen may differ as there are many factors such as cost of treatment, affordability by the patient, feasibility in the hospital, doctor’s decision and skill, and patient’s willingness to avail the treatment advised, all of which may vary from one country to another. This study is not comparing the results of closed reduction and open reduction techniques. It is an analysis of the mandibular fracture demographic variables and outcome of the management adopted in patients presented to our department. The results of the patients treated both closed and open methods were same as reported in the literature. In single fracture, the results both in the surgical and conservative groups are equal. Conservative group took longer time for improvement than surgical group since we maintain MMF for 4-6 weeks. In double and segmental fracture, surgical management had good outcome with double-plate fixation. High levels of success can still be achieved using available materials in the form of arch bars, eyelets, and wire osteosynthesis in the treatment of mandibular fractures using either the closed or open reduction technique in resource-poor settings despite the advent of miniplate osteosynthesis.

**REFERENCES**

Senthilkumar, et al.: Outcome of Mandible Fracture Management


Source of Support: Nil, Conflict of Interest: None declared.
Surgical Management of Congenital Glaucoma - A Long-term Clinical Study and its Outcome

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Abstract

Introduction: Congenital glaucoma (CG) is more common, aggressive, and difficult to control. It results in raised intraocular pressure and diminished visual acuity in children. Many surgical procedures are described in the literature in its surgical management. Trabeculectomy in chronic simple, narrow-angle, aphakic, and secondary glaucoma is good. Its response in CG is scanty in literature. The present study evaluates results of different procedures adopted in surgical treatment of CG.

Aim: The aim of this study is to evaluate the long-term results of surgery for CG.

Study Design: This is a retrospective comparative study.

Materials and Methods: Children aged below 14 years with CG surgically treated by methods such as goniotomy, trabeculotomy, trabeculectomy, combined trabeculotomy - trabeculectomy, cyclocryotherapy and Nd-Yag cyclophotocoagulation from January 2010 to December 2016.

Observations and Results: A total of 36.42 (85.71%) of the children were diagnosed as CG at birth. A total of 66 eyes (89.18%) were diagnosed as primary infantile glaucoma, 6 eyes (8.10%) had developmental glaucoma, and 2 eyes (2.70%) had secondary glaucoma. The mean corneal diameter 11.8±0.35 (range 9-18) mm and mean cupping 0.8 (range 0.3-1.1). The mean intraocular pressure was reduced from 27.8 ± 3.45 to 15.66 ± 1.50 mmHg. Trabeculectomy proved to be the most useful in achieving reduction in the mean intraocular pressure to 14 ± 1.0 mmHg.

Conclusions: The safe surgical procedure in treating CG was primary trabeculectomy. The success rate of all surgical procedures decreased on long-term follow-up. The visual outcome was satisfactory in 78.37% of the total eyes operated with a follow-up of 5 years.

Key words: Congenital and primary glaucoma, Glaucoma, Goniotomy, Trabeculectomy, Trabeculotomy

INTRODUCTION

Congenital glaucoma (CG) refers to glaucoma associated with developmental anomalies in the eye since birth. They may be associated with anomalies of the anterior chamber angle and trabecular meshwork alone or associated with other ocular or systemic/developmental anomalies. Pediatric glaucoma is a potentially blinding disease accounting for about 4.2% of childhood blindness. Hoskin based on anatomy classified developmental glaucoma into (1) isolated trabeculodysgenesis: A - flat iris insertion: Anterior insertion, posterior insertion mixed insertion, B - concave iris configuration, (2) iridotrabeculodysgenesis: A - anterior stromal defects, hypoplasia, and hyperplasia, B - anomalous iris vessels: Persistence of tunica vasculosus lentis, anomalous superficial vessels, C - structural anomalies: Holes, colobomata, aniridia, and (3) corneotrabeculodysgenesis, A - peripheral (axenfeld anomaly), B - mid peripheral (Reiger’s anomaly), and C - central (Peter’s anomaly).

Pediatric glaucoma is a potentially blinding disease accounting for about 4.2% of childhood blindness. In India, according to a population-based study in South India, the prevalence of Primary CG (PCG) is 1 in 3,300. The prevalence has varied from 1 in 10,000-20,000 in the West to 1 in 1250 in the gypsy population of Slovakia. Males constitute 65% of the cases. The most cases are sporadic. About 10% show a hereditary pattern, usually autosomal.

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reasessive with variable inheritance.5,6 Trabeculectomy is one of the most commonly performed operations for glaucoma. Fairly good results were obtained with trabeculectomy in chronic simple glaucoma,7,9 narrow angle glaucoma,10 aphakic glaucoma,8 and secondary glaucoma.10 Aim of the present communication is to report the follow-up of trabeculectomy in 50 cases of CG. In this context, the present study was conducted to evaluate the long-term results of surgery for CG in terms of reduced intraocular pressure (IOP) control and residual visual acuity in children under 14 years who underwent different surgical procedures for primary and secondary CG.

MATERIALS AND METHODS

The present study was a prospective study conducted in a tertiary teaching Hospital in Northern Kerala attached to Kannur Medical College, Kannur. A total of 42 children attending the OPD of Ophthalmology with diagnosis of CG were included in the study. An Institutional Ethical Committee clearance was obtained and committee approved consent letter was used for the inclusion of children in the study. The study period was between January 2010 and December 2016 (6 years). A thorough clinical history including family history of childhood glaucoma and consanguinity was elicited. Demographic data were collected using standard collection forms; pre- and post-operative ocular examination status, IOP, visual acuity, type of ocular surgery, age at the diagnosis of the disease and operation, intra- and post-operative notes, and complications were recorded. The clinical diagnosis was established based on measurements of IOP and by the presence of accompanying signs and symptoms of sustained, elevated IOP such as buphthalmos and corneal enlargement and edema as well as tearing and photophobia. All children were examined under chloral hydrate (50-100 mg/kg) sedation in the OPD. Ocular assessment includes microscopic evaluation of the anterior segment of the eye with slit lamp. IOP measurement was done under topical anesthesia by using handheld tonometer, Goldmann applanation tonometer, and pneumotonometer. The horizontal corneal diameter assessed by a ruler or caliper. Gonioscopy and fundoscopy performed by Koeppen lens if the cornea was clear. The selected eyes were operated using the following surgical procedures to lower IOP. The different procedures undertaken were goniotomy, trabeculotomy, trabeculectomy, combined trabeculotomy - trabeculectomy (CTT), cyclophotocoagulation (CYC), and contact Nd-Yag cyclophotocoagulation (CCT), and contact Nd-Yag cyclophotocoagulation (CYC). All the procedures were performed under general anesthesia, using standard techniques that are described in text books. The minimum follow-up required to be included in the study was 6 months from the date of glaucoma surgery. Post-operative drug therapy included topical dexamethasone, neomycin, and polymyxin B; 3 h and ointment at bedtime. Antiglaucoma drugs systemically used wherever necessary. During the stay at hospital, all children were examined on days 1-3 after surgery. After discharge, the follow-up was at weeks 1, 4, and 8 and then every 3 months thereafter for 5 years. At every examination, the anterior chamber depth, corneal appearance, bleb appearance, IOP, fundus, and any complications were looked for and recorded. All the data were analyzed using standard statistical methods like mean ± standard deviation, and the student’s t-test was used. Because of the variability in length of follow-up among patients, life-table (survival) analysis (Kaplan-Meier method) was used to estimate the success rate at various post-operative intervals.

OBSERVATIONS AND RESULTS

Totally, 74 eyes of 42 children were operated on including 29 male and 13 females. The mean age at the diagnosis was 10.25 ± 2.20. Nearly 64% of the children were diagnosed as CG at birth. There were 29 male and 13 female children with CG ratio of 2.23:1. The mean corneal diameter 11.8 (range 9-18) mm and mean cupping 0.8 (range 0.3-1.1). The mean cup to disc ratio was 0.6 among the 37 eyes. The mean intraocular pressure reduction was from 27.8 ± 2.10 to 15.45 ± 0.90 mmHg in 45 eyes (60.81%), following a mean number of operation/eye of 2.2, and a mean follow-up of 74.6 months. The mean age of the patients at surgery was 38.6 ± 3.40 months (Table 1). Among the 42 children, 30 children had bilateral CG (71.42%) and the remaining 12 (28.57%) were presenting with unilateral disease (right eye - 08 and left eye - 04), (Table 1). Family history of CG was positive in 11.42 (26.19%), (Table 1). A total of 27.42 children showed visual acuity <6.60 (64.28%) and above 6.60 visual acuity was in 15.42 (35.71%) children (Table 1).

Among the 74 eyes, 66 eyes (89.18%) were diagnosed as primary infantile glaucoma, 6 eyes (8.10%) had developmental glaucoma, and 2 eyes (2.70%) had secondary glaucoma (Table 2).

Among the 6 eyes of 3 patients who had goniotomy, 3 eyes failed within 3 months, repeat goniotomy had to be done in 2 eyes. The mean post-operative follow-up in this group was 4.60 ± 0.85 years. A total of 2 eyes had good visual acuity at the end of 5 years follow-up. Totally, 3 eyes developed scar in the cornea which affected the visualization of the angle and subsequently the result of surgery. The mean reduction of IOP was 17 ± 1.25 mmHg. The success rate was 2/74 (2.70%), (Table 3). In 5 eyes in this study trabeculotomy was done. Scar developed in 2/05 eyes. Corneal haze decreased in 3/05 eyes. The success rate in
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terms of gain in visual acuity was 3/74 (4.05%), (Table 3). A total of 37 eyes in the study underwent trabeculectomy. The mean reduction in IOP was 14 ± 1.0 mmHg. The success rate was 31/74 (41.89%) in terms of gain in visual acuity. Scar development was in 4/74 eyes (5.40%) and decrease in corneal haze was observed in 33/74 (44.59%) eyes (Table 3). CTT was done in 16 eyes. Mean IOP was found reduced to 15 ± 1.45 mmHg. Visual acuity was good in 9/74 (12.16%), average in 4/16 (5.40%) of the eyes operated. Scar was found in 2/16 and decreased corneal haze in 12/16 eyes (75%), (Table 3). A CCT procedure was under taken in 05 eyes. IOP was reduced to 16 ± 1.0 mmHg at the end of follow-up for 5 years and the success rate was 4/05 (80%) and there was no corneal haze or scar formation (Table 3). Nd-Yag cyclophotocoagulation was done in 5 eyes. The success rate was 100% and there were eyes with scar and decreased corneal haze in all the eyes (Table 3).

At the end of the study and follow-up of 5 years, the overall end results in terms of lowered IOP, improved visual acuity and reduced corneal haziness, optic disc diameter, and incidence of scar were analyzed in all the 74 eyes operated. The mean age at the diagnosis was 10.25 ± 2.20. 36/42 (85.71%) of the children were diagnosed as CG at birth. A total of 66 eyes (89.18%) were diagnosed as primary infantile glaucoma, 6 eyes (8.10%) had developmental glaucoma, and 2 eyes (2.70%) had secondary glaucoma. The mean corneal diameter 11.8 ± 0.35 (range 9-18) mm, and mean cupping 0.8 (range 0.3-1.1). The mean intraocular pressure reduction was from 27.8 ± 3.45 to 15.66 ± 1.50 mmHg; following a mean number of operation/eye of 2.2, and a mean follow-up of 94.6 ± 4.20 months. The mean age of the patients at surgery was 38.6 ± 3.40 months. Trabeculectomy proved to be the most useful in achieving reduction in the intraocular pressure to 14 ± 1.0 mmHg. There were no severe complications recorded in the study. Good recovery of visual acuity was found in 42/74 eyes (56.75%) operated and average recovery in 16/74 eyes (21.62%) and poor recovery in 16/42 eyes (21.62%), (Table 3).

During the post-operative period hyphema was noted in 16/74 eyes and total resolved in 10 days. Eccentric pull of pupil was noted in 5/74 eyes operated. Choroidal and exudative retinal detachment occurred in 1 child following trabeculectomy. The detachment resolved in 2 weeks.

### DISCUSSION

CG remains a responsible cause for blindness in children accounting for 4-18% of cases.11,12 In Indian literature few studies showed incidence of Congenital Glaucoma accounted for 4.2-7% of all causes causing blindness in children.12,13 CG cases are usually sporadic but 10-40%
are familial with frequent association with consanguinity. In majority of familial cases the transmission is autosomal recessive with variable expression and penetrance of 40-100%. Al-Hazmi et al reported family history in 21% of his patients and (61%) were the products of consanguineous marriages in Saudi’s population. In the present study, the consanguinity was observed in 11/42 (26.19%). Among all the surgical methods described in the surgical management of CG, trabeculectomy was found to give 48% absolute success and another partial success in 28% of their patients by Alex Joseph. However, this method was found to be less effective in CG. According to Alex, the trabeculectomy has the advantage over the other drainage operations by drainage of aqueous into the Schlemm’s canal beside, subconjunctival drainage which does not produce a large conjunctival bleb. Trabeculectomy can be easily repeated without much disfigurement which may be essential in CG. The complications observed after trabeculectomy are limited both in number and clinical importance. PCG in the present study was 66/74 eyes (89.18%). This could be explained to little extent due to consanguinity of 11.42 children (26.19%). Trabeculectomy was undertaken in 37 eyes and 23/74 showed recovery of good visual acuity (31.08%) and average in 8/74 (10.81-21.62%); total 41.89%. This success rate is comparatively higher than other modalities adopted in 37 eyes in the present study showing 27/74 (36.48%). There is no statistical difference between the two groups in the study (P - 0.842, P. significant at <0.05, using student t-test). Al-Hazmi et al reported low success rate of goniotomy (42%) and trabeculotomy (29%) in the early cases treated at King Khalid Eye Specialist Hospital between 1982 and 1990. In the present study the corresponding results were 2.70% and 4.05% respectively. This study observed an overall success rate in terms of gain in visual acuity was 78.37% of the total eyes operated with a follow-up of 5 years. Al-Hazmi et al reported that success rate of trabeculectomy increase with age, 32% for patients younger than 6 months and 85% for patients older than 4 years of age. In the present study, the overall mean age at surgery was 38.6 ± 3.40 months. Mullaney et al reported that the success rate of CTT was 78% for PCG and 45% for developmental and secondary CG. The present study showed success rate in regards with gain in visual acuity was 17.56%. CCT showed 100% success rate among the 5 eyes operated on and overall success rate was 5/74 6.75%. A total of 27/42 children showed visual acuity less than 6.60 (64.28%); legally blind and above 6.60 visual acuity was in 15/42 (35.71%) children.

**CONCLUSION**

The safe surgical procedure in treating CG was primary trabeculectomy. No significant different between trabeculectomy and other modalities of surgical treatments. The success rate of all surgical procedures decreased on long term follow-up. The visual outcome was satisfactory in 78.37% of the total eyes operated with a follow-up of 5 years. The main cause of visual loss is corneal opacity.

**REFERENCES**

Comparison of Extremely Drug Resistant Tuberculosis Versus Multidrug Resistant-Tuberculosis Patients Attending a Tertiary Care Center Delivering DOTs Plus Regime

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Abstract

Background: Extremely drug resistant tuberculosis (XDR-TB) is a very difficult clinical problem currently faced by many of the developing and some of the developed nations of the world. It is associated with considerable morbidity and mortality. Less effective medications with frequent side effects makes the scenario all the more worse. In Kerala, the Revised National Tuberculosis Control Programme (RNTCP) has implemented the Programmatic management of drug resistant tuberculosis by providing standardized treatment for XDR-TB under the CAT-V regime and CAT-IV regime for MDR TB patients under the DOTs plus strategy which is a nationwide TB control programme currently existent throughout the whole of India.

Aim: To compare the clinical profile and mortality trends of XDR versus MDR TB patients attending a tertiary care setting.

Methodology: All patients who got enrolled for the CAT-IV & CAT-V regime as per RNTCP for MDR & XDR-TB respectively at the DOTs plus centre, Kozhikode from June 2012 till the second quarter of June 2014 were included for the descriptive analysis.

Results: There were 4.14 & 0.22 cases per lakh population of MDR/XDR-TB cases reporting to this centre during this period. Majority were males, smokers among both the groups. 38.8% of MDR TB patients and 45% of XDR TB patients were diabetics. 50-60% mortality was observed for XDR TB patients during this period as compared to 16 -25 % mortality in MDR TB patients.

Conclusion: This study showed that XDR TB as compared to MDR TB was more difficult to manage and had more than double mortality rates. Hence stress should be more on early diagnosis and proper management of drug sensitive cases and MDR-TB cases and reducing incidence of XDR TB cases.

Key words: Extremely drug resistant tuberculosis (XDR-TB), MDR-TB (multi drug resistant tuberculosis), DOTs plus, mortality, Category -IV (CAT-IV) & Category -V (CAT-V) regimes.

INTRODUCTION

Extremely drug resistant tuberculosis (XDR-TB) is defined as resistance to at least INH, RIF, a fluoroquinolone, and one of the 3 second line injectable agents (AK, KM, or CM). Pre-XDR TB is defined as multidrug resistant-TB (MDR-TB) patients with resistance to either fluoroquinolone or second-line injectable drug. A few scattered reports reveal the prevalence ranging from 2.4% to 33.3%. By 2010, according to the World Health Organization (WHO), XDR-TB patients were reported from a total of 58 countries with at least one case. The proportion of XDR-TB among MDR-TB was 5.4% from pooled data. Velayati et al. introduced the term super XDR-TB, for strains with resistance to all available first and second line medications which are also known as total drug resistance (TDR). In a study conducted in KwaZulu Natal, South Africa, from 1428 presenting to the district hospital with signs and symptoms of TB, the probability of having MDR-TB was 13% and XDR-TB 2%. In Kerala, a
study by Joseph et al. revealed that ancestral East-African Indian lineage comprised the majority of circulating MTB genotypic clones.7

Treatment of the patients with XDR-TB is challenging because of the lack of potent anti-TB drugs, frequency of adverse reactions, and poor treatment outcomes.8,9 In a 2010 systematic review and meta-analysis by Jacobson et al., evaluating 13 observational studies including 560 patients, the pooled treatment success rate was 43.7% with a mortality of 20.8%.

Worldwide the reported proportion of MDR-TB was 4.9% among new cases and around 22% cases in retreatment cases in 2015. Kerala being a linear strip of land along the Arabian coast with 14 districts and estimated 32 million population, DOTs plus services were instituted for the southern seven districts with the DOTs plus site at Thiruvananthapuram in December 2008. The northern seven districts have their DOTs plus site located at Kozhikode which started functioning in February 2009. This study is a comparative analysis of XDR and MDR-TB patients started on CAT IV/CAT-V regime from the DOTs plus site of a tertiary care center aimed to know the profile and mortality trends in these patients.

MATERIALS AND METHODS

Aim of the Study
This paper is aimed to analyze the various trends noted while managing this dreaded disease as per the current PMDT Guidelines. This would definitely give insights regarding the severity and helps in predicting the possible outcome in many of these patients.

Study Methodology
Design
Study methodology design was STROBE - descriptive analysis.

Setting
DRTB Centre, Institute of Chest Diseases, Government Medical College, Kozhikode, Kerala, India.

Time of analysis
This study was conducted from June 2012 to June 2014, Second quarter.

Protocol
Inclusion criteria
All patients who got enrolled for the CAT-IV and CAT-V regime as per Revised National TB Control Programme (RNTCP) for MDR and XDR-TB, respectively, in this DRTB Centre from June 2012 till the second quarter of June 2014 were included in the study group and none were excluded from the study.

Study Proper
Patient data were recorded in structured format that included the demographic data, comorbidities, contact history, and other relevant details including HIV screening from a VCTC. The checklist for investigations should include, blood routine, urine routine, chest X-ray PA view, LFT, RFT, FBS/PPBS, Hba1c (optional), TFT, ECG, uric acid (optional), and pregnancy test in females in the reproductive age group. All the patients who were diagnosed as XDR-TB based on the culture report provided from the Intermediate Reference Laboratory at Thiruvananthapuram were started on a standardized weight based regime, Category V. The regime is for 24-30 months.

Drugs dosage/day (<45 kg/>45 kg) is as follows:
- Injection capreomycin (CM) 750 mg/1000 mg,
- PAS 10 g/12 g,
- Moxifloxacin (MFX) 400 mg,
- High dose INH 600 mg/900 mg,
- Clofazimine (CFZ) 200 mg,
- Linezolid (LZD) 600 mg,
- Amoxyclav(Amx/Clv) 875/125 mg BD,
- Pyridoxine 100 mg
(Reserve/substitute drugs: Clarithromycin 500 mg BD, thiacetazone 150 mg).

Intensive phase (6-12 months) Cm, PAS, MFX, high dose-H, CFZ, LZD, AMX/CLV followed by.

Continuation phase (18 months) PAS, MFX, high dose-H, CFZ, LZD, AMX/CLV.

All MDR-TB patients received CAT-IV regime as follows:
6(9) Km Z E LFX Eto Cs/18 E Lfx Eto Cs

The profile and mortality trend of the XDR-TB patients were analyzed and compared against the MDR-TB patients enrolled in the DRTB Centre at that point of time.

RESULTS
There were a total of 785 patients enrolled for the second line regimes in the DOTs plus site of Kozhikode at this point of time. Out of this, 745 (94.9%) were MDR-TB patients and 40 were XDR-TB (5.1%) Figure 1.
Upon finer scrutiny, it was seen that out of the 40 XDR-TB patients enrolled for CAT-V regime, 37.5% (15/40) cases came under the definition of true XDR-TB, 60% (24/40) came under the Pre-XDR-TB group and one patient was started on CAT-V following failure of CAT-IV regime Figure 2. This works out to 4.14 and 0.22 cases per lakh population for MDR/XDR-TB cases, respectively.

There was a clear gender preponderance noticed among the XDR-TB patients with males dominating the picture with a male to female ratio of 3.4:1, Table 1. A similar picture was seen in case of MDR-TB patients where the male to female ratio was 3.7:1, Table 2. The clear gender predominance in either groups points toward the fact that males are more prone to develop serious forms of pulmonary TB which could be due to poor adherence to treatment and increased mobility of the male gender exposing themselves to the higher risk of acquiring the disease through airborne transmission related to his job or due to his addictions or associated comorbidities which might be compromising these patients’ immune system.

The body weight of both MDR and XDR-TB patients showed that there were a large proportion of patients belonging to >45 kg weight band in either group, Tables 3 and 4.

A huge number of smokers were seen among MDR-TB patients and by the time they got transformed to XDR-TB the number of smokers dropped drastically to about 50% of smokers as seen among the MDR-TB patients, Table 5.

When the number of diabetics in both groups was compared, it was seen that 38.8% of MDR-TB and 45% of XDR-TB patients were diabetics, thus making diabetes a major risk factor in converting drug-sensitive organisms to a drug-resistant variety.

Hence, addressing diabetes by concurrently offering specialized care for diabetes control could curtail to a great extent the development of this menace, and currently,
all the smear positive cases coming under RNTCP are screened for both retro positive statuses as well as for the presence of uncontrolled diabetes, Tables 6-9. Fortunately, the proportions of retro positive patients among MDR and XDR-TB patients are not alarming at present.

About 17.6% cases among the MDR-TB patients and 24% cases of XDR-TB cases had adverse events warranting admission. Arthralgia due to hyperuricemia, sensorineural deafness attributable to aminoglycosides, hypothyroidism due to thioamides and PAS, psychiatric abnormality and peripheral neuropathy due to cycloserine and bone marrow suppression due to LZD were among the serious side effects encountered in our center. However, it was interesting to note that despite having high incidence of GI intolerance which was a common manageable side effect on an OP basis, only very few patients had hepatic derangement requiring inpatient care.

Three consecutive years of treatment success was analyzed for MDR-TB patients and it was found to be around 58-60% which conforms to the existing reported success rates in well-managed DOTs plus centers elsewhere in the world, Table 10.

A similar attempt was done to assess the treatment success trends of XDR-TB patients during the same period. It was noted that the treatment success rate was as low as 30-50% in case of XDR-TB patients (Table 11) which clearly points toward the fact that this could be a setback for the success of the DOTs plus program unless the number of XDR-TB cases are drastically reduced by placing proper stress on managing drug sensitive TB and MDR-TB cases and to offer tailored regime based on the second line drug sensitivity pattern for XDR-TB cases.

When we looked into the mortality trends of these dreaded disease, it was seen that MDR-TB has a mortality of 16-25% which skyrocketed to the alarming rates of 50-60% in cases of XDR-TB (Tables 12 and 13).

DISCUSSION

In India, the RNTCP offers standard regime for all MDR and XDR-TB patients under the DOTs plus strategy. 2 years beyond sputum conversion is the standard treatment duration recommended for XDR-TB. Results from the 2013 meta-analysis by Falzon et al., reported treatment success was highest if at least 6 drugs were used in the intensive phase and four in the continuation phase.

| Table 6: Diabetic status of MDR and XDR-TB patients |
|-------------|-------------|-------------|
| Variable    | MDR         | XDR         |
| Total patients | 745         | 40          |
| Diabetics   | 289         | 18          |
| Percentage  | 38.8        | 45          |

MDR‑TB: Multi drug resistant tuberculosis, XDR‑TB: Extremely drug resistant tuberculosis

<table>
<thead>
<tr>
<th>Table 7: Gender status of MDR-TB diabetics</th>
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<tbody>
<tr>
<td>MDR diabetics n=289 (%)</td>
</tr>
<tr>
<td>Males</td>
</tr>
<tr>
<td>202 (69.9)</td>
</tr>
<tr>
<td>Females</td>
</tr>
<tr>
<td>87 (30.1)</td>
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MDR‑TB: Multi drug resistant tuberculosis

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<tr>
<th>Table 8: Gender status XDR-TB diabetics</th>
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<tr>
<td>XDR diabetics Total (18) %</td>
</tr>
<tr>
<td>Males</td>
</tr>
<tr>
<td>15 (83.3)</td>
</tr>
<tr>
<td>Females</td>
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<tr>
<td>3 (16.7)</td>
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XDR‑TB: Extremely drug resistant tuberculosis

<table>
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<th>Table 9: HIV status XDR-TB patients</th>
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<tr>
<td>Variables</td>
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<tr>
<td>Total</td>
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<tr>
<td>745</td>
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<tr>
<td>HIV +</td>
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<td>14</td>
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<td>%</td>
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<td>1.9</td>
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MDR‑TB: Multi drug resistant tuberculosis, XDR‑TB: Extremely drug resistant tuberculosis

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<th>Table 10: Success rates of MDR-TB patients</th>
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<tr>
<td>Year</td>
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<tr>
<td>2012/2013/2014-2nd quarter</td>
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<tr>
<td>Total MDR registered</td>
</tr>
<tr>
<td>153/112/56</td>
</tr>
<tr>
<td>Treatment success</td>
</tr>
<tr>
<td>68/34/34</td>
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<tr>
<td>Success rate (%)</td>
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<td>34/34/34</td>
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MDR‑TB: Multi drug resistant tuberculosis

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<tr>
<th>Table 11: Success rates of XDR-TB patients</th>
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<tr>
<td>Year</td>
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<tr>
<td>2012/2013/2014-2nd quarter</td>
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<tr>
<td>Total XDR registered</td>
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<tr>
<td>6/8/10</td>
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<tr>
<td>Treatment success</td>
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<tr>
<td>3/3/3</td>
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<tr>
<td>Success rate (%)</td>
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<td>3/3/3</td>
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</table>

XDR‑TB: Extremely drug resistant tuberculosis

<table>
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<th>Table 12: Mortality trend of MDR-TB patients</th>
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<tr>
<td>Year</td>
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<tr>
<td>2012/2013/2014-2nd quarter</td>
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<tr>
<td>Total MDR registered</td>
</tr>
<tr>
<td>153/112/56</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>25/18/25</td>
</tr>
<tr>
<td>Death rate (%)</td>
</tr>
<tr>
<td>16.30/16.10/25</td>
</tr>
</tbody>
</table>

MDR‑TB: Multi drug resistant tuberculosis

<table>
<thead>
<tr>
<th>Table 13: Mortality trend of XDR-TB patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>2012/2013/2014-2nd quarter</td>
</tr>
<tr>
<td>Total XDR registered</td>
</tr>
<tr>
<td>6/8/10</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>3/4/6</td>
</tr>
<tr>
<td>Death rate (%)</td>
</tr>
<tr>
<td>50/50/60</td>
</tr>
</tbody>
</table>

XDR‑TB: Extremely drug resistant tuberculosis
also noted that addition of a newer quinolone resulted in more success despite the strain showing resistance to an earlier quinolone in vitro. This study was performed as an effort to compare the clinical profile as well as the mortality trends in MDR and XDR-TB patients attending our center.

In our study, male gender, uncontrolled diabetes, and smoking status were associated with more number of MDR and XDR-TB patients which has to be further evaluated as potential risk factors for the development of drug-resistant TB. In one study, super-XDR-TB (total drug resistance) patients (n = 15), the male to female ratio was more than threefold, with statistical relevance (P < 0.05). There were a considerable number of pre XDR-TB patients who were started on CAT-V regime owing to quinolone resistance in our study. Hence, routine use of quinolones without ruling out TB should not be encouraged in any case of lower respiratory tract infection. Recent studies report that approximately 30% of OFX-resistant strains are still susceptible to MFX. Jacobson et al. reported that use of a later generation fluoroquinolone in the setting of XDR-TB was associated with better treatment outcomes. In a 2014 retrospective study from the Republic of Korea by Jo et al., MDR-TB patients with OFX-resistant disease had significantly better treatment outcomes when the isolate was MFX-susceptible (treatment success in 73% vs. 42%).

In two randomized studies, XDR-TB patients treated with LZD had higher culture conversion and treatment success than those in control arms. However, in both studies, 82% of the patients had clinically significant adverse events. In a systematic review (11 studies, 148 patients), any adverse event was 62% with 36% discontinuing LZD due to adverse events. Hence, there was evidence for the fact that LZD was responsible for about 58% of adverse events leading to discontinuation of an XDR regime which indirectly adds to the increased mortality and low success rate of XDR-TB management. High rates of myelosuppression and neurologic toxicity (with peripheral and optic neuropathy which were often not reversible) were encountered with regimes comprising higher doses of LZD.

Alternate choices such as ethionamide and prothionamide with PAS increased gastric intolerance and induced hypothyroidism more rapidly. CFZ containing regimens have been associated with a higher percentage of culture conversion (40% vs. 29%) and an independent predictor of conversion and survival in patients with XDR-TB. In a small randomized controlled trial, sputum culture conversion and cavity closure occurred earlier in patients in the CFZ-containing regimen, and treatment success was higher (74% vs. 54%). Five of six patients with severe XDR-TB converted cultures to negative with a regimen containing meropenem plus amoxicillin/clavulanate which indicates that it could be effective in selected cases.

In a double-blind randomized controlled trial of high-dose INH (16-18 mg/kg) versus placebo in addition to second-line drugs, those who received high-dose INH were 2.38 times more likely to convert cultures to negative than those on placebo and they had a 2.37 times higher rate of being culture negative at 6 months. There was a higher frequency of peripheral neuropathy in the high-dose INH arm. Bedaquiline (BDQ) is a diarylquinoline drug hyped as a wonder drug with significant in vitro and in vivo activity against MTB. At 6 months of treatment, culture conversion was achieved in 97%. 7 patients (20%) experienced a ≥60 ms increase in QT interval leading to discontinuation in 2 (6%). Diacon et al. reported death of 7 patients during the trial at a median of 386 days after the last dose. When an effective WHO-recommended regimen in adult MDR-TB patients comprising 4 second line drugs in addition to PZA cannot be designed and when there is documented evidence of resistance to any fluoroquinolone, alternate newer drugs are being evaluated as intensive phase drugs. BDQ as a replacement for the injectable agent in MDR-TB is currently approved for clinical use by FDA. Delamanid (DLM) is a nitro-dihydro-imidazooxazole derivative which was approved for the treatment of MDR-TB by the European Medicines Agency but has not yet received FDA approval. RCT by Gler et al., in 481 patients who were randomized to receive DLM 100 mg twice daily, 200 mg twice daily, or placebo for 2 months in combination with a WHO-recommended regimen observed that sputum culture conversion in liquid broth occurred in 45.4% of the patients taking DLM at 2 months compared with 29.6% on the placebo regimen. There are currently no safety data on the concurrent use of DLM and BDQ.

When it comes to comorbid illnesses, Lai et al. showed diabetes mellitus to be the most frequent underlying disease (60%), followed by chronic pulmonary disease (20%) and lung cancer (10%), along with end-stage renal disease (10%).

In the study conducted in Japan, patients with XDR-TB were more likely to have diabetes mellitus (OR 2.095% CI: 0.34-11.85) and a history of malignancy (OR 5.25, 95% CI: 0.52-61.86) although not statistically relevant. In another study, diabetes mellitus is still the condition that is more prevalent (18.7%).

HIV had a predictive value for the diagnosis of XDR-TB, being 2.5-fold higher. In many studies, no HIV-positive patients were found. In one study, the population was specifically HIV-negative. However in our study, also HIV was not encountered as a major association but 38.8% of MDR and 45% XDR-TB patients had diabetes. Several studies showed that the positive predictive value for the diagnosis of XDR-TB was significantly high with increased duration and multiple courses of the previous treatments (OR 1.2, 95% CI: 1.11-2.30).

Many potential factors might contribute to treatment failure; the most relevant in many studies being male gender and HIV-

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Computed Tomography Scan Findings and Glasgow Coma Scale 15 in Head Trauma Patients

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Abstract

Introduction: Traumatic brain injuries have been an important problem of public health for a long time. Most common and important complication of traumatic head injury is the development of a traumatic intracranial lesion which results in increased intracranial pressure and brain damage. Computed tomography (CT) scan is used as an important and non-aggressive method to diagnose and treat patients.

Aim: The aim is to study the incidence of positive CT brain in head-injured patients with Glasgow coma scale (GCS) score 15.

Methods: Patients who were admitted with head injury were included in the study. All patients were subjected to CT scanning without any historical or clinical selection criteria. Patients with GCS <15 were excluded from the study.

Results: Patients with findings in CT correspond to 12.86% of the study patients. About 39% of patients had fracture, 25% of patients had contusion, and 5% of patients multiple findings.

Conclusion: CT scan is essential in the management of patients with minor head injuries.

Key words: Computed tomography scan findings, Glasgow coma scale, Head trauma

INTRODUCTION

Head injury refers to traumatic brain injury (TBI) which is classified into mild, moderate, and severe types based on Glasgow coma scale (GCS). Many times, the clinical status correlates well with the radiological findings in computed tomography (CT) scan.¹ On some occasions, they do not match. Most of the patients with GCS 15 do not have a positive finding in a CT scan. Still, some may have findings in CT scan. On few occasions, they may require intervention if there is deterioration in clinical condition or worsening of CT findings. Even though severe complications requiring neurosurgical intervention are usually rare in mild TBI patients, fear of the consequences of delayed treatment has led many to do CT scanning in patients with mild TBI. This follows the trend of increasing CT usage in diagnosis.²³ A certain percentage of patients with “mild” head injury who present with no or minimal disturbance unconsciousness subsequently deteriorate.⁴ Incidence of this phenomenon often referred to as “talk and deteriorate” has been reported to between 1.0% and 3.0% of those patients who were initially diagnosed as having a mild head injury. Emergency physicians need to decide which patients need urgent imaging, who needs observation, and which patients can be sent home. Nearly 90% of head CT scans have negative results for clinically important brain injury.⁵ Only 1% of all cases of these cases require neurosurgical intervention. The incidence of abnormal CT findings in mild head injuries varies in various reports ranging from 5% to 28%, of which 0.76% to 8.57% required surgical interventions. Most physicians rely on clinical criteria such as GCS score, loss of consciousness, mode of injury, and changes in mental status to predict the probability of intracranial lesion; however, some studies have demonstrated that normal neurological examination does not reliably rule out intracranial lesions. This had led some authors to recommend liberal use of CT scanning.
even in patients with a GCS score 15 or a history of the significant mechanism of injury. In this study, we study the patients with TBI admitted with GCS 15 and have positive findings in CT.

**Aim**
The aim is to study the incidence of positive CT brain in head-injured patients with GCS score 15.

**MATERIALS AND METHODS**

The study was done at the Department of Neurosurgery at the Madras Institute of Neurology, Madras Medical College, and Rajiv Gandhi Government General Hospital, Chennai. The Institutional Ethics Committee approval and informed consent from patients’ relatives were obtained. Patients who were admitted with head injury were included in the study. All patients were subjected to CT scanning without any historical or clinical selection criteria. Exclusion criteria: Patients who were admitted in head injury ward 24 h after the occurrence of injury, patients referred with CT brain from outside our institution, and patients with GCS <15 were excluded from the study.

**RESULTS**

5308 patients were screened for this study, in that 3536 patients presented with GCS 15 which corresponds to 66% of the study group. All the patients with GCS 15 were taken CT brain, out of the total patients, 455 patients had one or more findings in CT brain. Patients with findings in CT correspond to 12.86% of the study patients. About 39% of patients had fracture, 25% of patients had contusion, and 5% of patients had multiple findings (Figure 1). In 455 abnormal CT brain, 383 were male patients and 73 were female patients. The most common mode of injury is road traffic accidents, 95 patients (65%), next common mode of injury was fall, 134 patients (29%), followed by assault 35 patients (6%). Nearly 92% of patients were treated conservatively (Figure 2).

The total patients admitted with GCS 15 and were operated corresponds to 0.9% compared to total population of patients with GCS 15. Out of the 455 patients who had positive CT scan, 37 patients (8.1%) had no symptoms. Out of the 27 patients of depressed fractures, 1 was a compound depressed fracture which was operated. One case of extradural hematoma which had no symptoms was operated.

**DISCUSSION**

Head injury is a major health problem and a frequent cause of death and disability. In developing countries, the incidence of TBI is increasing as traffic increases, besides other confounding factors such as industrialization, falls, and ballistic trauma. Radiographic examination of the skull is an essential part of the management of head trauma, but its limitations in plain radiographs are now recognized even in the diagnosis of skull fractures. CT facilitates a comprehensive diagnosis and permits early and targeted intervention.6,7

The reported incidence varies from place to place and so are the management guidelines. The variable management practices could be attributable to availability of resources and neurosurgical care. CT examination has become a standard tool in the investigation of head injury owing to its better sensitivity over skull radiographs and lower cost compared to magnetic resonance imaging. Although CT
has almost revolutionized the diagnostic workup of head injury, its applicability in all cases is now debatable. Careful patient selection based on clinical parameters and selective ordering of CT scan without jeopardizing patient care would not only reduce the cost of hospital stay but also undue radiation exposure in many.8,9

In a study by Joseph et al.,10 a mild GCS score (GCS 13-15) in patients with an intracranial injury does not preclude progression on repeat head CT and the need for neurosurgical intervention. Melo et al.11 also indicated that of patients with mild brain injury, neurosurgery was performed in 6.7% and 9.2% had neurological disabilities. In fact, mild brain injury based on GCS score may be associated with significant abnormalities in CT scan, require of neurosurgical procedure and intensive care unit admission. Moreover, Chieregato et al.12 showed that the GCS scoring system was not enough for assessing brain injury, and therefore, it should be combined with other systems such as TBI classification.

CONCLUSION

CT scanning is the primary modality of choice in the diagnostic workup of patients with acute TBI for identification of various intracranial consequences, especially within 48 h, which helps in the initial assessment, treatment planning, and follow-up and long-term management of patients. CT scan allows rapid assessment of the extent and type of brain pathology which ensures patients who require urgent surgical intervention at the earliest opportunity. CT scan is essential in the management of patients with GCS 15 as a positive CT will guide a more vigilant and better management and also the treatment outcome is better.

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Etiological Evaluation of Partial Seizure by Computed Tomography

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Abstract

Introduction: Seizure occurs in up to 10% of the population whereas epilepsy is a chronic disease characterized by recurrent seizures that may affect up to 2% of the population. Modern neuroimaging is useful in diagnosis of abnormalities underlying the epilepsies, but the information provided by imaging techniques can also contribute to proper classification of certain epileptic disorders and can delineate the genetics of some underlying syndromes.

Aim: To study the incidence of structural lesion in partial seizures, to identify the cause for partial seizures in different age groups, electroencephalogram (EEG) changes predicting computed tomography (CT) lesions and to identify clinical clues which predict a structural lesion in partial seizure.

Methods: Prospective observational study was conducted. Detailed history and clinical examination is carried out to ensure the organic nature of epilepsy. EEG and CT were done; results are critically analyzed for the presence of focal, localized, or generalized changes by montage-wise analysis.

Conclusion: Seizures are an important cause of morbidity in adults. It is therefore important to establish accurate diagnosis of seizures and its etiologies to manage appropriately such patients.

Key words: Clinical features, Computed tomography, Partial seizure

INTRODUCTION

Partial seizures are those, in which, in general the first clinical and electroencephalographies (EEGs) changes indicate initial activation of a system of neurons limited to part of one cerebral hemisphere.¹ Many Investigations have suggested that people with partial seizures are more likely to have recurrence than generalized seizures. In the evaluation of partial seizure - we the physician utilize various tools.² First and foremost is the history of illness and then, EEG and neuroimaging. The incidence of structural abnormality in partial seizure is relatively high when compared to generalized seizure, and it is about 78% in a study by Misra et al., done at Banaras Hindu University, Varanasi. EEG helps us to identify the functional site of epileptogenesis even though the yield is low and also helps us to identify the mirror focus.³ In the era of epilepsy surgery, a clinical approach which mixes the skillful history elicitation, EEG, neuroimaging together helps us to localize the site of origin of seizure and thereby helps us to have a better cure rate. In our present study, we are intended to identify the correlation between the clinical history, EEG, and neuroimaging in the identification of the site of lesion and also to study the incidence of structural lesion in partial seizures and also to identify clues in the clinical history and examination which points toward structural lesion.

Aim

To study the incidence of structural lesion in partial seizures, to identify the cause for partial seizures in different age groups, EEG changes predicting computed tomography (CT) lesions and to identify clinical clues which predict a structural lesion in partial seizure.
MATERIALS AND METHODS

Prospective observational study was conducted in a tertiary care hospital. Detailed history and clinical examination is carried out to ensure the organic nature of epilepsy. Results are critically analyzed for the presence of focal, localized, or generalized changes by montage-wise analysis. Individual abnormalities are recorded in the pro forma. CT scan brain plain and contrast axial section with routine slice thickness performed in all cases. Radiologist's opinion obtained, abnormalities noted. Finally, the data were analyzed combining the clinical, EEG and CT scan brain findings and conclusion arrived.

RESULTS

In 76 patients of which three did not turn up for CT brain and EEG, so a drop out of three cases. Finally, the study included 73 cases, in them detailed history, clinical examination, and investigations were completed. In our study population, children under 13 years were 28 in number. Adults under 45 years were 38 in number. Adults more than 45 years were seven in number. In study group, youngest patient was 9 months old baby. The eldest person was 70 years old. Among the total 73 cases, 29 patients had simple partial seizures, 42 patients had complex partial seizure, and two patients had both simple and complex partial attacks. Duration of illness before reporting for medical advice, <1 week - 18, <1 month - 33, and more than 1 month - 22. The right focal seizure was noted as 43 patients and the left focal seizure is 30 patients. When we analyzed the symptomatology of our patients’ headache was the most frequent symptom, and it was reported in 25 cases. 31 patients out of the 73 cases had clinical signs of deficit (42.5%). Among the clinical signs, hemiparesis was seen in 14 patients (19.2%) among these patients CT scan brain was abnormal in 12 patients (85.87%). Five patients had papilledema (6.8%). CT brain was abnormal in all the five patients (100%). Three patients had hemisensory deficit (4.1%) and CT brain was abnormal in two patients (67%). Three had facial weakness of upper motor neuron type (4.1%). CT brain was abnormal in three (100%). Three had extensor plantar response (4.1%) - CT was abnormal in all the three patients (100%). Two patients had homonymous hemianopia (2.7%) in this CT brain was abnormal in both (100%). One patient had paraparesis 1.4% in whom CT was abnormal showing a suprasellar mass lesion. Among the 73 patients who were examined 31 patients had deficit which amounts to 42.5%. 28/31 patients with signs of neurological deficits postictal had structural lesions in their CT brain.

In our study, CT brain was abnormal in 47 patients (64.4%). 28 patients among these 47 patients had deficits on clinical examinations (59.6%). 19 patients with CT brain abnormality did not show any deficit (Table 1). Hemiparesis was the most frequent deficit noted. Hemisensory, upper motor neuron (UMN) facial weakness, homonymous hemianopia, papilledema, extensor plantar response alone, and paraparesis were also noted (Table 2). In the etiological aspect, contrast-enhancing granuloma was the most frequent lesion. We have encountered contrast-enhancing granuloma in 55.3% of our study populations (Table 3). EEG was abnormal in 40 cases (56.2%). Lateralizing EEG changes were noted in 26 cases; among the patients CT brain was abnormal in 20 cases (76.92%). Bilateral changes were noted in 14 cases; among these CT was abnormal in four cases (35.7%) (Table 4). Among 47 cases with CT lesions, 31 cases lesions were seen in parietal lobe (Table 5). One

### Table 1: Postictal neurological deficits in predicting CT brain lesions

<table>
<thead>
<tr>
<th>Clinical signs of deficits</th>
<th>Present</th>
<th>Absent</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>28</td>
<td>3</td>
<td>31</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Absent</td>
<td>19</td>
<td>23</td>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

CT: Computed tomography

### Table 2: Clinical deficits seen in study patients

<table>
<thead>
<tr>
<th>Clinical deficit</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemiparesis</td>
<td>14 (45.16)</td>
</tr>
<tr>
<td>Papilledema</td>
<td>5 (16.13)</td>
</tr>
<tr>
<td>Hemisensory impairment</td>
<td>3 (9.68)</td>
</tr>
<tr>
<td>UMN facial weakness</td>
<td>3 (9.68)</td>
</tr>
<tr>
<td>Extensor plantar response</td>
<td>3 (9.68)</td>
</tr>
<tr>
<td>Homonymous hemianopia</td>
<td>2 (6.45)</td>
</tr>
<tr>
<td>Paraparesis</td>
<td>1 (3.22)</td>
</tr>
</tbody>
</table>

UMN: Upper motor neuron

### Table 3: CT lesion seen in study patients

<table>
<thead>
<tr>
<th>CT lesion</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast-enhancing granuloma</td>
<td>26 (55.31)</td>
</tr>
<tr>
<td>Infarct</td>
<td>10 (21.27)</td>
</tr>
<tr>
<td>Mass</td>
<td>4 (8.51)</td>
</tr>
<tr>
<td>Postictal edema</td>
<td>2 (4.25)</td>
</tr>
<tr>
<td>Calcification</td>
<td>1 (2.12)</td>
</tr>
<tr>
<td>AVM</td>
<td>1 (2.12)</td>
</tr>
<tr>
<td>Tumors</td>
<td>1 (2.12)</td>
</tr>
<tr>
<td>Gliosis</td>
<td>1 (2.12)</td>
</tr>
<tr>
<td>Diffuse gyral enhancement</td>
<td>1 (2.12)</td>
</tr>
<tr>
<td>Total</td>
<td>47 (100)</td>
</tr>
</tbody>
</table>

CT: Computed tomography, AVM: Arteriovenous malformation

### Table 4: EEG abnormalities

| Phase reversal                              | 11                     |
| Bilateral spike, sharp waves                | 14                     |
| Focal or unilateral sharp waves             | 8                      |
| Focal slow waves                            | 7                      |

EEG: Electroencephalogram
Among the patients with granuloma EEG was positive in 16 cases. Totally, among 26 cases of ring-enhancing granulomas as evidenced in CT brain, 16 patients had EEG abnormality (61.5%). Interestingly, 15 patients had shown lateralizing EEG abnormalities (93.75%). Predominantly, granulomas were seen in younger population. Among the 26 cases, 23 cases were at or under 18 years of age, three were in their 20-35 years of age group. Infarct was seen in 10 cases here to parietal lobe was the most common site (Figure 1). 8/10 cases shown die infarct in the parietal lobe. EEG was abnormal in four cases (40%) of which three had lateralizing EEG changes, and one showed generalized changes. Among the four cases with mass lesion, EEG was abnormal in two cases both of them showed generalized changes. Patient with tuberous sclerosis also showed generalized EEG changes. Patient with AVM showed lateralizing EEG changes. Patient with calcification and gliosis did not show any EEG abnormality. Hence, totally among the 47 patients with CT abnormality 25 had shown abnormal EEG (53%). Post-ictal edema is reported in two cases. Both in young-age group, one confirmed by repeat CT brain and other with MRI scan. Both did not show any EEG abnormality.

**DISCUSSION**

Overall, we have studied 73 cases. The incidence of partial seizures is almost equally distributed among male and female population. Complex partial motor seizure was the most common entity. Incidence of partial seizure is more common in younger population than in older. More frequent in young adults and children. When compared to generalized seizures, partial seizures are known to produce more clinical signs when evaluated postictal. In our study, 31 cases out of the 73 (42.46%) had positive clinical signs. Hemiparesis was the most frequent deficit noted. Hemisensory, UMN facial weakness, homonymous hemianopia, papilledema, extensor plantar response alone, and paraparesis were also noted. We have statistically analyzed whether people who have a deficit or sign on clinical examinations have a higher chance of harboring a structural lesion in their brain when compared to those who do not have any deficit. Furthermore, it was proved that those who have a deficit have more incidence of structural lesion than those who do not. Among the patients with clinical signs or deficit postictal, 28/31 had structural lesion on CT brain. Headache was the most common symptom reported by our patients. This history was given in 25 cases. Among the 73 cases studied EEG was abnormal in 40 cases (56.2%). 25 out of 40 patients with EEG abnormality had CT brain lesions (62.5%). This is almost comparable to an Indian Study done in 2003 by Baheti et al. In their study, 57.9% of cases with EEG abnormality had abnormal CT brain. Generalized EEG changes were noticed in 14 cases and lateralizing EEG changes in 26 cases. We have analyzed the statistical significance of both these changes independently in predicting structural lesion in the CT brain. Analysis showed that EEG showing lateralizing changes is more specific in picking up structural lesion than EEG with generalized changes. Patients with EEG showing lateralized changes have a sensitivity of about 42.5% and specificity of 76.9% in predicting CT brain abnormality. With a very significant P value (P = 0.0032) (Table 7). Patients with generalized EEG changes have a sensitivity of 10.6% and specificity of 65.3% in predicting a structural lesion (Table 8). Hence, in general patient with EEG changes in partial seizure are more likely to have structural lesion than those who do not. However, in specific patient with lateralizing changes have more chance of having structural lesion than generalized changes. Among the localized EEG changes, phase reversal is more predictive of structural lesion (81%) followed by focal spike, sharp, and slow waves accounting for about 70%. In the etiological aspect, contrast-enhancing granuloma was the most frequent lesion. We have encountered contrast-enhancing granuloma in 55.3% of our study populations. In our study, CT brain was abnormal in 64.4%.
compared to a study by Misra et al. in the year 1994, this is a bit low. In their study, structural lesions were noted in 79.3% (Table 9).³

Similar study in children was done in the year 2004 by Hussain et al.⁷ In their study, the incidence of structural lesion was 68% which is almost close to our study. In their study also contrast-enhancing granuloma was the most common lesion. We have observed that patients with granulomatous contrast-enhancing lesions have more chance of their EEG being abnormal when compared to other patients with structural lesions. Incidence of lateralizing EEG abnormality was also more in patients with granulomatous lesions. Distribution of granuloma was most commonly noted in parietal lobe 21/26 (81%) of which left side was > more common than right with 30% more on the left compared to the right side. Overall 34 cases, of the 47 cases with structural lesion had their lesion in the parietal lobe (72.3%). Hence, it shows that parietal lobe lesions are the most common cause of partial motor seizure.

CONCLUSION

Seizures are an important cause of morbidity in adults. It is therefore important to establish accurate diagnosis of seizures and its etiologies to manage appropriately such patients. Those patients who have a post-ictal neurological deficit has higher incidence of CT lesions. Among all granulomas - NCC is the most common cause of focal seizures. Among the structural lesions, EEG changes are more common in those with granulomas. Parietal lobe is the most common site for structural lesions in epileptics with partial seizure.

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Dynamic Contrast Study and Diffusion Weighted Imaging with 3T Magnetic Resonance Imaging in Differentiation of Benign from Malignant Masses of Female Breast

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Abstract

Introduction: Breast cancer is the most common cancer in females and is the 2nd leading cause of death among female after lung cancer.

Materials and Methods: Study includes 50 cases of breast masses in female came for magnetic resonance imaging (MRI) examinations between February 2015 and September 2016. MRI examination routine sequences along with dynamic contrast-enhanced (DCE) study and diffusion-weighted imaging (DWI) and the results were compared with the cytopathological examination considered as the standard diagnostic method.

Results: There were 18 benign lesions and 32 malignant lesions fond in this study. DCE-MRI proved to have a sensitivity of 93.75%, and a specificity of 72.2% in diagnosing malignant pathologies. Apparent diffusion coefficient cutoff value to differentiate the benign from malignant lesions was $1.4 \times 10^{-3}\text{mm}^2/\text{s}$ ($P < 0.001$).

Conclusion: The combined MRI protocol including DCE-MRI and DWI proved to be increasing the sensitivity and specificity of MRI in differentiating benign from malignant lesions.

Key words: Breast masses, Diffusion-weighted imaging, Dynamic contrast enhanced magnetic resonance imaging

INTRODUCTION

Breast cancer is the most common cancer in females and is the 2nd leading cause of death among female after lung cancer. Survival in women with breast cancer can be increased by early diagnosis of disease. There is a increasing clinical interest in developing noninvasive methods that can be used early in the course of disease to assess risk and to guide subsequent treatment.

Initial screening modality for detection and localization of breast abnormalities include conventional mammography and ultrasound sonography. Mammography has long been used for early detection of and screening for breast cancers. It is believed that mammography alone misses between 10% and 30% of all breast cancers. Possible reasons may include density of breast parenchyma and slow growing breast cancers. Ultrasound has been used as an adjunct to mammography, with particular useful in differentiating cystic from solid lesions and in facilitating guided biopsy of suspicious areas. Among the newer modalities, US elastography is used, which is based on...
tissue elasticity, three-dimensional ultrasound has also been highlighted.

Magnetic resonance imaging (MRI) is the newer non-invasive imaging modality that has been rapidly developed over the past decade and is regarded as the most potential examination modality for diagnosis of breast cancer. Dynamic contrast-enhanced MRI (DCE-MRI) is useful in local staging and breast lesion characterization. The sensitivity of DCE-MRI ranges from 85% to 100%, specificity range from 37% to 88%. Diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) values improves the differential value of MRI, amends the positive predictive value, and reduces unnecessary biopsies. The sensitivity of breast DWI can range from 80% to 96% and its specificity in the range of 46-91%. Partridge et al. concluded that there is 10% improvement in the positive predictive value (PPV) when combining DWI with DCE-MRI in the differentiation of breast masses. 3.0 T MRI appears superior to 1.5 T, as it allows faster scanning, high signal to noise ratio, improved spatial resolution and hence allowing improved lesion characterization and anatomical detail, leading to increased accuracy in diagnosing the lesion, and predicting the malignant potential.

Multimodal imaging techniques provide more accurate analysis, which is confirmed by more and more evidence, but none of the imaging methods are sufficiently specific to provide a histological diagnosis. However, guided biopsies enable precise histological or cytological confirmation.

Criteria for characterization of breast masses by DCE-MRI are lesion morphology and enhancement kinetics. According to BIRAD MRI lexicon, morphological evaluation of breast lesions is done by evaluating its shape, margins, and enhancement characteristics, enhancement distribution, and internal enhancement pattern. Kinetic evaluation is done by detecting the initial and post-initial enhancement of the breast lesion. Here, we want to study the role of DCE-MRI study and DWI in differentiation between benign and malignant lesions.

Aims and Objectives

Aims and objectives of the study were to determine the role of DWI and DCE-MRI in the characterization of breast tumors and to determine the sensitivity and specificity of MRI study in comparison to cytopathology in differentiation between benign and malignant masses and thus reducing the unnecessary diagnostic interventional procedures.

**MATERIALS AND METHODS**

A prospective observational, cross-sectional, analytical study was conducted in 50 cases of female breast masses detected clinically, by ultrasound and mammography from February 2015 to September 2016 in the Department of Radiodiagnosis, Pt. Jawahar Lal Nehru Memorial Medical College, and associated Dr. B. R. A. M. Hospital, Raipur, Chhattisgarh, India. We included 20-50 years aged females having breast masses detected clinically or by ultrasonography (USG) or by mammography. All the patients underwent clinical examination, USG, mammography and then MRI scan which included DWI, and dynamic contrast study with routine sequences. Diagnosis made by MRI was compared with cytopathological diagnosis obtained after fine-needle aspiration cytology/biopsy.

We used MAGNETOM SKYRA, Siemens, Germany, 3T field strength MRI with dedicated breast coils. 70 cm open bore design. Approximately 35 m² room size. RF Tim (204 × 48) (204 × 64) (204 × 128). Gradient strength – XQ Gradients (45 mT/m at 200 T/m/s). Zero helium boil-off technology with pressure injector. The data for the study will be collected through a uniform pro forma to be filled for every patient. All patients were examined using a 3T magnetic resonance machine after taking informed consent. All patients were examined in the prone position using dedicated breast coil. MRI was done within 7-14 days of menstrual cycle in premenopausal women. Examination included image acquisition followed by image post-processing.

The conventional MRI protocol included localizing sagittal view (scout view), axial nonfat saturated T2-weighted image (T1WI) obtained by fast spin echo with the following imaging parameters: TR 5.4-6 ms, TE 2.46 ms, slice thickness 1.5 mm, field of view (FOV) 300-360 mm, FOV phase 100, distance factor 20, slice thickness 1.5 and matrix was 384 × 384, and short TI inversion recovery (STIR) with the following parameters: TR 3500-6000 ms, TE 54 ms and inversion time (TI) was 230 ms, slices 30, slice thickness was 1.5 mm, FOV 300-360 mm, FOV phase 100, and the matrix was 384 × 384. DCE-MRI was made in the axial plane with fat suppression by applying fat saturated pulse. Total duration of DCE-MRI is 7.17 min. The sequence used was 3D-T1WI with the following parameters: TR 4.75 ms, TE 1.61 ms, flip angle 20-25, slice thickness 1.5 mm with no inter-slice gap, FOV 300-600 mm and the matrix was 288 × 320 distance factor-20 DCE-MRI was performed after injection of a bolus of gadopentetate dimeglumine, in a dose of 0.16 mmol/kg using an automated injector at a rate of 2 ml/s through a 18-20 gauge intravenous cannula inserted in an antecubital vein. Contrast injection was followed by a bolus injection of saline (total of 20 ml at 2 ml/s). Dynamic
study consists of one pre-contrast and 5 post-contrast series, each of them took about 1.08 min with a break between the pre- and post-contrast study about 20 s. Duration of contrast injection is 10 s. DWIs were obtained before dynamic images using a diffusion-weighted echo-planar imaging sequence with parallel imaging. Sensitizing diffusion gradient in three orthogonal directions with b values of 0, 800, and 1000 s/mm² were applied. The ADC maps were created automatically, and the ADC values were calculated.

Image post processing includes image subtraction which was obtained by subtracting each of pre-contrast images from each post-contrast series images, creation of time to signal intensity curves for suspicious enhancing lesions and maximum intensity projection views obtained through each orthogonal plane, producing sagittal, coronal and axial projections. STIR images were first examined to detect the presence or absence of any lesion. In DCE-MRI the type of lesion enhancement (mass or non-mass-like enhancement) was determined, and morphologic features were analyzed. For mass enhancement lesions, the shape, margins, signal intensity on STIR and T1WI were assessed as well as enhancement characteristics of the lesion. For non-mass lesions, the distribution of enhancement, and internal enhancement.

Data were expressed as a percentage and mean ± standard deviation. Kolmogorov–Smirnov analysis was performed for checking the linearity of the data. Parameters in parametric data and Mann–Whitney U-test were used to check the significance of difference between two parameters in non-parametric data difference between frequency distribution of the data. Receiver operating characteristics curve was plotted to analyze to diagnostic significance of diagnostic method used. \( P < 0.05 \) was considered as statistically significant. Microsoft® Inc. USA was used perform the statistical analysis.

**RESULTS**

This study included 50 patients with age ranging from 20 to 65 years. Cytopathologic analysis of these lesions revealed 18 benign lesions (36%) and 32 malignant lesions (64%). The peak age incidence of breast mass lesion was 20 to 65 years. In our study, 38.9% of benign lesions and 40.6% of malignant lesions were present in retroareolar region, 22.2% of benign and 15.6% of malignant lesions were in outer and upper quadrant, 5.6% of benign lesions were in axillary tail, 5.6% of benign lesions were at multiple locations in breast, 16.7% of benign lesion and 3.1% of malignant were in outer and lower quadrant, 9.4% of malignant lesions were in upper inner and outer quadrant, 5.6% of benign and 25% of malignant lesions were in upper and inner quadrant. 5.6% of benign lesion and 6.2% of malignant lesion involved the whole breast. The association between site of the lesion and neoplasticity was not significant statistically (\( P = 0.157 \)).

Most common benign lesions were chronic inflammation and fibroadenoma which represents 36.8% and 15.8%, respectively, while the most common malignant lesions were invasive ductal carcinoma which represents 55.6%.

Most common shape of the benign lesion was either round (61%) or oval (16.7%). Most common shape of the malignant lesion was either round (40.6%) or irregular (28%). The association between shape of the lesion and neoplasticity was not significant statistically (\( P = 0.669 \)).

In this study, the margins of benign lesions were variable with a predominance of smooth margins (72.2%) while the margins of malignant lesions were irregular or spiculated and they represent 59.4% and 18.8%, respectively. The association between margin of the lesion and neoplasticity was statistically significant (\( P = 0.002 \)).

In this study, the homogenous enhancement was seen in 44.4% of benign lesions and 56% of malignant lesions, heterogeneous enhancement was seen in 16.7% of benign lesions and 37.5% of malignant lesions, rim enhancement was seen in 22.2% of benign lesions and 6.2% of malignant lesions. The association between enhancement pattern of the lesion and neoplasticity was statistically significant (\( P = 0.021 \)).

In this study, the enhancement kinetics curve, Type I curve (Figure 1) was seen in 61.2% of benign lesions and 3.1% of malignant lesions; Type II curve (Figure 2) was seen in 27.8% of benign lesion and 71.9% of malignant; Type III curve (Figure 3) was seen in 11.1% of benign lesions and 25% of malignant lesions. The association between enhancement kinetics of the lesion and neoplasticity was statistically significant with \( P = 0.0001 \) (Table 1).

In all 50 lesions, we could localize and measure the ADC value of each lesion. The mean ADC of benign lesions was \( 1.62 \times 10^{-3} \text{mm}^2/\text{s} \) (range 0.74-2.2 \( \times 10^{-3} \)), and that of malignant lesions was \( 1.03 \times 10^{-3} \text{mm}^2/\text{s} \) (range 0.60-1.7 \( \times 10^{-3} \)). The association between DWI (ADC values) of the lesion and neoplasticity was statistically significant, with \( P = 0.003 \). ADC values were significantly lowered in malignant lesions compared with benign lesions. The best ADC cutoff value to differentiate between benign and malignant lesions was \( 1.4 \times 10^{-3} \text{mm}^2/\text{s} \) (Table 2).

In this study, the sensitivity and specificity of DCE-MRI examination were 93.75% and 72.2%, respectively; which was based on the combination of morphologic, diffusion (ADC values) and enhancement kinetic curve.
DISCUSSION

An analytical study of “dynamic contrast study and DWI in female breast masses using 3Tesla MRI and its comparison with cytopathological findings (benign vs. malignant)” was conducted. Cytopathologic analysis of these lesions revealed 18 benign lesions (36%) and 32 malignant lesions (64%).

This study included 50 patients ranging from 20 to 65 years age. The peak age incidence of breast mass lesion was between 40 and 50 years. The average age group of breast mass lesion was 45.94 years. The results of our study matched with the studies of Kriege et al., Warner et al., and Leach et al.23-25

In this study, 38.9% benign lesions and 40.6% of malignant lesions were present in retroareolar region, 22.2% of benign and 15.6% of malignant lesions were in outer and upper quadrant, 5.6% of benign lesions were in axillary tail, 5.6% of benign lesions were at multiple locations in breast, 16.7% of benign lesion and 3.1% of malignant were in outer and lower quadrant, 9.4% of malignant lesions were in upper inner and outer quadrant, 5.6% of benign and 25% of malignant lesions were in upper and inner quadrant, 5.6% of benign lesion and 6.2% of malignant lesion involved the whole breast. The association between site of the lesion and neoplasticity was statistically not significant ($P = 0.157$).
The results of our study differ from the previous studies conducted by Mahoney et al., Darbre and El Bakry et al. who stated that the most common location of both benign and malignant lesions is in the upper outer quadrant. This difference may be because of small sample size in our study.

In this study, the two most common benign lesions were chronic inflammation and fibroadenoma which represents 36.8% and 15.8%, respectively, while the most common malignant lesions were invasive ductal carcinoma which represents 55.6%. Similar finding was also observed by Li et al. and El Bakry et al.

In this study, most common shape of the benign lesion was either round 61% or oval 16.7%. Most common shape of the malignant lesion was either round 40.6% or irregular 28%. The association between shape of the lesion and neoplasticity was statistically not significant, $P = 0.669$. 

Figure 2: Bilateral infiltrating ductal carcinoma in 50-year-old woman seen at retroareolar region of left breast and upper outer quadrant of right breast. (a) T1 FSE axial images, (b) T1 axial images, (c) T2 axial, (d) diffusion axial, (e) dynamic contrast-enhanced, and (f) subtracted image shows irregular mass with irregular margins with apparent diffusion coefficient (ADC) map reveals $\text{ADC} = 0.82 \times 10^{-3} \text{ mm}^2/\text{s}$ within both the masses. (g) Time-signal intensity curve of mass shows Type II plateau curve in both the lesions. Mass was correctly classified as malignant (BI-RADS 4c) according to combined imaging protocol.
Figure 3: Infiltrating ductal carcinoma in 60-year-old woman seen at the retroareolar region of left breast (a) T2W axial, (b) diffusion weighted axial image - apparent diffusion coefficient (ADC) map reveals restricted diffusion (ADC = 1.01 × 10⁻³ mm²/s) within mass, (c) dynamic contrast-enhanced, and (d) subtracted image shows rounded mass with irregular margins showing homogenous intense contrast enhancement. (e) Time-signal intensity curve of mass shows Type III washout curve. Mass was correctly classified as malignant (BIRAD V) according to combined imaging protocol. (f) Histopathological finding shows infiltrative ductal carcinoma.

Table 1: Comparison of frequency of type of breast lesion on cytopathology in different shape of T/SI curve

<table>
<thead>
<tr>
<th>Shape of T/SI curve</th>
<th>Final diagnosis on cytopathology</th>
<th>Total</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Benign</td>
<td>Malignant</td>
<td></td>
</tr>
<tr>
<td><strong>Type I</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>11</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>% within final diagnosis on cytopathology</td>
<td>61.2</td>
<td>3.1</td>
<td>22.0</td>
</tr>
<tr>
<td><strong>Type II</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>5</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>% within final diagnosis on cytopathology</td>
<td>27.8</td>
<td>71.9</td>
<td>56.0</td>
</tr>
<tr>
<td><strong>Type III</strong></td>
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</tr>
<tr>
<td>Count</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>% within final diagnosis on cytopathology</td>
<td>11.1</td>
<td>25.0</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Count</td>
<td>18</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>% within final diagnosis on cytopathology</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
In this study, the enhancement kinetics curve, Type I curve was seen in 61.2% of benign lesions and 3.1% of malignant lesions; Type II curve was seen in 27.8% of benign lesion and 71.9% of malignant; Type III curve was seen in 11.1% of benign lesions and 25% of malignant lesions. The association between enhancement kinetics of the lesion and neoplasticity was statistically significant with $P = 0.0001$. Our results matched with results of Kul et al. who reported higher sensitivity (97.9%) and lower specificity (75.7%) in their study. Our results also match with the study of Ghazala et al. who stated that, sensitivity of MRI is 98.6%, specificity of MRI is 78.8% PPV of MRI is 90.6% negative predictive value of MRI is 95.3%, accuracy of MRI is 91.8%. Our results match with studies of El Bakry et al., in having high sensitivity, i.e., 97.2%, but does not match in having high specificity, i.e., 94.7% in the diagnosis of breast cancer. Our results disagree with Hetta who proved low sensitivity and specificity of DCE-MRI examination, i.e., 80% and 73.33%, respectively.

CONCLUSION

MR mammography is a noninvasive, well tolerated, non-hazardous modality for detection, diagnosis, and staging of breast cancer. This study proves morphologic appearance, mean ADC value and kinetic curves help in differentiating benign from malignant lesions. ADC values are low for malignant lesions and high for benign lesions. Type I enhancement kinetic curve is more in favor of benign lesion, Type II and Type II curve are more in favor of malignant lesions. Combined DWI and DCE, MRI protocol using 3T MRI with dedicated breast coils increases the sensitivity in diagnosis of breast cancer. Thus, it can be helpful in reducing the unwanted biopsies and surgery.

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Clinical Study of Cholelithiasis

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Abstract

Introduction: Cholelithiasis is a chronic recurrent disease of the hepatobiliary system. The impaired metabolism of cholesterol, bile acids and bilirubin are characterized by gallstone formation.

Materials & Methods: In the present study, apart from studying the epidemiology i.e., demographic factors, dietary habits, clinical presentation, diagnostic tools and management, it also looks at the stone analysis, bile culture and complications after surgery in rural population in central India.

Results: In this study, 90 cases of cholelithiasis who were admitted in Mahatma Gandhi Memorial Hospital during November 2009 to October 2011 were studied. At present, available literature on cholelithiasis is reviewed and the results of the study are compared with those of other authors. The results are been tabulated in form of tables.

Conclusion: The highest age incidence of cholelithiasis was in the 5th and 6th decade with maximum incidence in the 5th decade. There was an increased incidence in females.

Key words: Cholelithiasis, Gallstones, Cholecystectomy, Laparoscopy

INTRODUCTION

Among the many distinguished names in Hindu medicine that of Sushruta, the “father of Indian surgery” stands out in prominence, he compiled the surgical knowledge of his time in his classic “Sushruta Samhita.” It is believed that this classic was compiled between 800 BC and 400 AD; he described a jaundice called pitta - ashmarijanya meaning a jaundice caused by stone in bile. It was also known that such jaundice could be caused by wrong diet.

The prevalence of gallbladder stone varies widely in different parts of the world. In India, it is estimated to be around 4%. An epidemiological study restricted to railroad workers showed that North Indians have 7 times higher occurrence of gallstone as compared with South Indians. There has been a marked increase in the incidence of the gallstone in the West during the past century. In the United States, the autopsy series has shown gallstones in at least 20% of women and 8% of men over the age of 40 years.

It is estimated that at least 20 million persons in the United States have gallstones and that approximately 1 million new cases of cholelithiasis develop each year. The prevalence in Europe is 18.5% from the autopsy studies with the lowest prevalence from Ireland (5%) and the highest from Sweden (38%). In Australia, the prevalence rate varies from 15% to 25%. Highest prevalence in Pima Indian tribe of Arizona with total and female prevalence of 49% and 73%, respectively.

Gallstones are rare in Africa with the prevalence of <1% and in Japan, it has been increased from 2% to 7%.

Diagnosis of gallstone is by proper history and physical examination and combining it with appropriate investigation which varies from surgeon to surgeon and hospital to hospital and country to country.

Changing incidence in India is mainly attributed to Westernization and availability of investigation that is ultrasound to urban as well as rural area and also because of increased affordability due to change in the socioeconomic structure and the cost of investigations.
Due to the increased incidence of gallstones and its variable presentations in India as well as in the West, there is a great need for a study which can provide the information regarding the prevalence of the disease, various clinical presentation and management, and outcomes of the cholelithiasis.18-25

MATERIALS AND METHODS

This dissertation titled “A clinical study of cholelithiasis” was done at Mahatma Gandhi Memorial Hospital, Warangal, for a period of November 2009 to October 2011.

A total of 90 cases of cholelithiasis were admitted, examined, investigated, and operated during the period between November 2009 and October 2011. Detailed history of all the 90 cases was taken that included information regarding the age, sex, nature of the symptoms, duration of the symptoms, past history of similar complaints, diet history, history of OCP, alcohol ingestion, and diabetes. All patients underwent detailed examination, hemogram, electrocardiogram, liver function test, blood sugar, blood urea, serum creatinine, urine analysis, blood group, chest X-ray, and ultrasound scan of the abdomen. Relevant investigations and specialty consultations were taken for patients with associated medical illness and their control was ascertained pre-operatively.

Risk and complications of the condition as well as surgery have been explained to the patients, written consent was obtained. Appropriate pre-operative antibiotics were given. After opening the abdomen, the pathological features and anatomical variations were noted, bile obtained from the gallbladder with a syringe and sent for culture sensitivity. Based on clinical investigation and operative criteria, exploration of the common bile duct (CBD) was done. In this study, some of the patients had undergone open cholecystectomy and some of the patients underwent laparoscopic cholecystectomy due to the factors such as previous operation and obese patient. A subhepatic tube drain was used in patients who underwent open cholecystectomy and connected to collecting bag. The abdominal wound was closed in layers. The gallstone was sent for chemical analysis and the gallbladder for histopathological examination. All patients received antibiotics and routine post-operative care. Patient was properly examined in the post-operative period to note the development in any complication. Suitable treatment was given according to the need. Antibiotics were given and subsequently changed according to the bile culture and sensitivity report. Patients who underwent laparoscopic cholecystectomy were discharged on the 3rd day and those who underwent open cholecystectomy were discharged on the 7th day, unless any complications. Patients were advised regarding diet, rest, and to visit the surgical OPD for regular follow-up.

In the follow-up period, attention was given toward improvement of the patients with regard to symptoms as well as examination of the operative scar.

RESULTS AND DISCUSSION

In this study, 90 cases of cholelithiasis who were admitted in Mahatma Gandhi Memorial Hospital during November 2009 to October 2011 were studied. At present, available literature on cholelithiasis is reviewed and the results of the study are compared with those of other authors.

Age of Incidence

There is an increased incidence of cholelithiasis in the 5th and 6th decade with the peak in the 5th decade. In the study, the youngest patient was 15-year-old and the oldest patient was 72-year-old (Table 1).

Similar incidence is seen in the studies of Herman et al. (5th decade). Hanif series showed peak incidence in the 5th decade. In Western studies, the peak incidence is in the 5th and 6th decades. The rise in the peak age of incidence is due to change in the dietary factor. Similar findings were noted in the studies of Ganey et al. and Moreaux et al.

Distribution of Cases by Sex

In the present study, 54 patients were female and 36 patients were male. The present study shows that gallstone disease is a common problem in female population. The female-to-male ratio is 3:2 (Table 2).

Battacharyya’s series showed 71.4% were female and 28.6% were male. Similar sex preponderance in favor of females was noted by Tamhankar, Ganey et al., and Major Alok

<table>
<thead>
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<th>Table 1: Age of incidence</th>
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<tr>
<td>Age in years</td>
</tr>
<tr>
<td>11-20</td>
</tr>
<tr>
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<tr>
<td>31-40</td>
</tr>
<tr>
<td>41-50</td>
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<tr>
<td>51-60</td>
</tr>
<tr>
<td>&gt;60</td>
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</table>

<table>
<thead>
<tr>
<th>Table 2: Sex distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>
Sharma et al. series showed that 70% were male and 30% were female.

**Presenting Symptoms**

Pain was the most common symptom presenting in 88 patients, 50 patients had nausea and vomiting, and 12 patients had jaundice (the cause of the jaundice was stone in the CBT. The CBT was explored in these patients and stones were removed). Dyspepsia was present in 20 patients (relieved after cholecystectomy) and fever (secondary to cholangitis due to biliary obstruction) was present in 8 patients (Table 3).

Similar presentations were noted in the series of Alok Sharma, Ganey series, and Goswitz et al. series.

**General Physical Examination**

In the study, 55 patients were moderately built and nourished, 20 were obese. These observations are against the time-honored aphorism that fat people are more prone for this disease. 60 patients were diabetic and 45 patients were hypertensive. Pallor was present in 26 patients who were corrected with blood transfusion.

**Presenting Signs**

In the present study, 87 patients had tenderness in the right hypochondrium, whereas 28 patients had guarding and 7 patients had mass in the right hypochondrium (Table 4).

**Investigations**

All the patients underwent routine hematological and biochemical investigations. The hemoglobin of patients ranged from 5 to 15 g%. Serum bilirubin was raised in 7 patients, levels ranged from 1.8 to 5 mg%.

**Ultrasound**

Ultrasound scanning of the abdomen was done in all patients. 90 patients had stone in gallbladder, 13 patients had stones in both gallbladder and CBT (Table 5).

**Pre-operative Evaluation**

A hemoglobin level of 10 g% was accepted for the surgery. Blood transfusion was given to selected patients to improve the hemoglobin level. 10 cases diagnosed as acute cholecystitis were managed conservatively with IV fluids, nasogastric aspiration, antibiotics, and analgesics. These patients were treated conservatively and were then offered surgery after 6 weeks. All diabetic patients were maintained on insulin injection in the pre-operative period. Associated medical illness was treated accordingly before taking the patient to surgery.

**Type of Operation**

In the present study, 44 patients underwent laparoscopic cholecystectomy and 46 patients underwent open cholecystectomy (Table 6).

**Incision in Open Cholecystectomy**

Out of 46 patients who underwent open cholecystectomy, 31 were operated through a right subcostal incision, 13 patients were operated through right paramedian incision, and 2 patients through a right transverse incision (Table 7).

**Post-operative treatment**

All the patients were given IV fluids, nasogastric aspiration was done, and antibiotics and analgesics were given. Drainage tube was removed between 3 to 10 days based on the drainage. T-tube cholangiogram was performed in 13 patients and T-Tube was removed after confirmation of the patency of the duct.
Complications
In the present study, 6 patients had wound infection. 2 patients had post-operative bile leak which was managed conservatively and patients recovered. 4 patients had bile duct injury which was repaired on the T-tube (Table 8).

Histopathology Report
In the present study, 86 patients were reported as having chronic cholecystitis, 4 patients had acute cholecystitis, and no case of malignancy was noted (Table 9).

Types of Stones
In the present study, gallstones analysis was done in all patients. 81 patients had mixed type of stones, 7 patients had cholesterol stones, and 2 patients had pigment stones (Table 10).

Bile Culture
Bile culture was done in all patients, 68 patients had no growth, 14 cases reported growth of *Escherichia coli*, 4 patients had growth of *Klebsiella*, and 2 patients each having reported the growth of *Staphylococcus aureus* and *Pseudomonas*. These results were similar to the studies of Mathur *et al.*, Goswitz *et al.*, and Battacharya *et al.* (Table 11).

Follow-up
There was no problem in the follow-up period in any patient.

SUMMARY
1. The highest age incidence of cholelithiasis was in the 5th and 6th decade with maximum incidence in the 5th decade. There was an increased incidence in females.
2. Pain was the most common symptom (present in 97.78% of the patients), nausea and vomiting were the second most common symptom present in 55.56% of patients, dyspepsia was present in 22.22% of patients, jaundice in 13.33% of patients, and 8.88% of patients had fever.
3. Tenderness in the right hypochondrium was the most common sign present in 96.67%, guarding was the next sign present in 31.11% of the patients and mass abdomen in 7.78% of the patients.
4. Ultrasonography is the investigation of choice in our hospital. All patients had gallstones, 24.44% of patients had solitary stone. 75.56% of patients had multiple stones, 14.44% of patients had bile duct stones, 80% had thickening of gallbladder, 12.22% had gallbladder distension, and 7.78% had gallbladder mass.
5. About 48.88% of patients underwent laparoscopic cholecystectomy, 51.11% underwent open cholecystectomy. Laparoscopy to open conversion rate was found to be 4%. Right subcostal incision was the most common incision used in open cholecystectomy.
6. The post-operative complication in the present study was 13.33%. Wound infection was the most common, 2 patients had post-operative bile leak which was managed conservatively and the patients recovered.
7. Histopathology revealed chronic cholecystitis in majority of the cases while bile culture revealed no growth in majority of cases in the present study.
8. Gallstones analysis showed mixed stone in 90% of the cases and cholesterol stones in 7.78% of the cases as the most common variety.
9. There was no mortality in the present study.

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Radiology-pathological Correlation of Primary Benign Bone Tumors: A Retrospective Study

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Abstract

Introduction: Benign primary bone tumors are relatively rare, which create some difficulty for diagnosis and treatment. Benign bone tumors occur most frequently between the ages of 5-25 years and in the areas of greatest bone growth, with about 60% of cases in the knee region.

Aim: The aim is to study the radiological and pathological correlation of benign bone tumors.

Materials and Methods: We have reported 62 cases of bone tumors during the study of 5 years in the Department of Pathology, Thoothukudi Medical College, India. The cases were thoroughly studied by histopathology and 28 cases were diagnosed as benign tumors among which 8 cases were benign osteoid-producing and 20 cases were diagnosed as benign cartilage-producing tumors conclusively. The histopathology diagnosis was correlated with the radiological features.

Results: In benign bone tumors, osteochondroma was the most common neoplasm. Computed tomography scan established the best choice in studying cortical lesions and nidus in osteoid osteoma. Magnetic resonance imaging can delineate the medullary extent. Multinucleated giant cells were seen in sections of chondroblastoma. Histopathology provided the final, conclusive diagnosis. The most common benign bone tumor occurring in children is osteochondromas, representing 10-15% of all bone tumors and 20-50% of all benign bone tumors.

Conclusion: Benign bone tumors frequently pose a diagnostic challenge for general surgical pathologists. Accurate pathologic diagnosis requires careful clinical, radiological, and histopathological correlation.

Key words: Benign bone tumors, Computed tomography, H and E stain, Magnetic resonance imaging, Radiograph

INTRODUCTION

Inadequate investigations have resulted in erroneous diagnosis of benign lesions as malignant, resulting in unnecessary surgical procedures. Osteoid osteoma arises from the long bones of the limbs presenting with pain.1 Osteoblastoma is a rare tumor, with a locally aggressive behavior. Osteochondroma is the most common benign tumor. Hyaline cartilage cap is the continuity of this lesion with the underlying native bone cortex and medullary canal that is pathognomonic of osteochondroma. Müller suspected osteochondromas to arise from erroneous differentiation of cells in the periosteum. Genetic linkage analysis has located three etiological genes for osteochondroma hereditary multiple exostoses (HME)-EXT1 (8q24.1),2 EXT2 (11p11-p12),3,4 and EXT3 (19p).5 The Knudson theory’s application to osteochondroma pathogenesis has been strengthened by noted EXT gene losses and mutations in chondrosarcomas arising from osteochondromas.6-9 Loss of functional EXT1 or EXT2 in a chondrocyte alters its ability to attach heparan sulfate to the proteins intended for its in the cell surface and its immediate extracellular milieu.10-12 Fibroblast growth factor-receptor 3 causes cell cycle exit by activating the transcription factor STAT1, which induces expression of p21.13 In osteoid osteoma, currently percutaneous, radiofrequency ablation (RFA) is being used under computed tomography (CT) guidance which is being used...
with increasing frequency.\textsuperscript{14} Osteoid osteoma resolves spontaneously over time and can be treated conservatively with nonsteroidal anti-inflammatory drugs.\textsuperscript{15} They account for 10\% of all benign bone lesions and there is a male predilection.\textsuperscript{16} Osteoblastoma is located in the spine or major bones of the lower extremity.\textsuperscript{17,18} According to Dorfman and Weiss,\textsuperscript{19} aggressive osteoblastoma is diagnosed microscopically by the presence of wider or more irregular trabeculae, osteoid trabeculae are bordered by epithelioid-appearing osteoblasts. Importantly, up to 3\% of patients with HME will eventually develop a chondrosarcoma in the cartilaginous cap of the lesion.\textsuperscript{20-23} The supposition that accelerated chondrocyte differentiation and early ossification could create a local excess of bone.\textsuperscript{24,25}

**Aim**
The aim is to study the radiological and pathological correlation of benign bone tumors.

**MATERIALS AND METHODS**

We have reported 62 cases of bone tumors during the study of 5 years in the Department of Pathology, among which 28 cases were diagnosed as benign bone tumors conclusively. Among the 28 cases, 8 cases were benign osteoid tumors and 20 cases were benign cartilage-producing tumors. The five basic parameters of importance in the diagnosis are the age of the patient, bone involved, specific area within the bone, radiographic appearance, and microscopic appearance. The data were stored in the department computer server was very much useful in the retrospective histopathology and radiology correlation study.

**RESULTS**

This retrospective study covered a total number of 62 cases reported, among which 28 cases were diagnosed by histopathology as various types of benign tumors. A total of 8 cases were osteoid-producing tumors and 20 cases were cartilage producing benign bone tumors conclusively at Thoothukudi Medical College, India. The details of age, sex, and location of various benign bone tumors were studied. Osteochondroma was the most common tumor reported with growth from the cortex away from the joint (Table 1).

The long bones are frequently involved in most of the benign tumors of bone and were around the knee joint showing a high frequency of involvement. Chondroma is one benign cartilage-producing tumor showing involvement of distal small bones of the hand and foot (Table 2).

The correlation was done with histopathological features with radiographic findings. The various radiological patterns in benign osteoid tumors is a nidus with a central translucent area with surrounding bone sclerosis and in benign cartilage-producing lesions is an area of translucency surrounded by calcifications. Histopathologically benign osteoid tumors showed a highly vascularized area with immature osteoid present. The cartilage-producing tumors showed cartilage production, calcifications were seen and a few cases showed giant cells surrounding them (Table 3).

<table>
<thead>
<tr>
<th>Table 1: Various types of benign bone tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tumor</strong></td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Osteoid osteoma</td>
</tr>
<tr>
<td>Osteoblastoma</td>
</tr>
<tr>
<td>Chondroma</td>
</tr>
<tr>
<td>Osteochondroma</td>
</tr>
<tr>
<td>Chondroblastoma</td>
</tr>
<tr>
<td>Chondromyxoid fibroma</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

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Osteoid Osteoma
Six cases were reported. The age group was between 12 and 23 years of age. Most osteoid osteomas occur in long tubular bones of the limbs, proximal femur, but any bone may be involved. Five lesions were found in the lower end of the femur and one in the fibula. Intense pain was the most prominent symptom. Radiographically, the typical finding is a radiolucent central nidus that is not larger than 1.5 cm. Lesions of long bones are usually metaphyseal. An osteoid osteoma is composed of three concentric parts: Nidus, fibrovascular rim, and surrounding reactive sclerosis.

The pain associated with osteoid osteoma is characteristically more intense at night is due to the effect on nerves and vessels by osteoblast-produced prostaglandin E2, COX1, and COX2. The word nidus literally means “nest.” The treatment of choice is surgical removal of nidus and surrounding tissue. Six cases of osteoid osteoma were reported. They were surgically removed with adequate margin. The pain relief after treatment is so dramatic that the patient realizes on recovery from anesthesia that the lesion has been removed (Figures 1 and 2).

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Femur</th>
<th>Humerus</th>
<th>Tibia</th>
<th>Fibula</th>
<th>Vertebra and pubic ramus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoid osteoma</td>
<td>5</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osteoblastoma</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chondroma</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Osteochondroma</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chondroblastoma</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Chondromyxoid fibroma</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2: Bones involved in the study of benign tumors of bone

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Radiographic findings</th>
<th>Histopathological findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoid osteoma</td>
<td>CT scan shows an area of central translucency measuring &lt;1.5 cm in diameter, in cortex surrounded by dense sclerosis. The reactive new bone is dense</td>
<td>Sections studied show a nidus with a fibrovascular core, plump osteoblasts are surrounding the anastomosing bone with dense sclerotic bone</td>
</tr>
<tr>
<td>Osteoblastoma</td>
<td>CT scan shows an area of translucency measuring more than 2 cm. In this case measuring 5 cm in diameter. The margins are irregular. Cortical expansion and thinning was noted</td>
<td>Sections studied show a nidus with plump osteoblasts rimming the broad irregular bone trabeculae</td>
</tr>
<tr>
<td>Chondroma</td>
<td>X-ray of the left-hand ring shows an area of translucency expanding the cortex and with a popcorn calcification distally</td>
<td>Sections studied show areas of cartilaginous tissue in lobules with areas of calcifications</td>
</tr>
<tr>
<td>Osteochondroma</td>
<td>X-ray shows a pedunculated growth from femur measuring 6 cm with the growth seen drifting away from knee joint</td>
<td>Sections studied show a cartilaginous cap overlying broad bands of bone trabeculae</td>
</tr>
<tr>
<td>Chondroblastoma</td>
<td>X-ray femur showing an area of translucency with calcification</td>
<td>Sections studied show highly cellular areas of mononuclear cells and giant cells with chicken-wire calcification</td>
</tr>
<tr>
<td>Chondromyxoid fibroma</td>
<td>T2 weighted MRI of lower femur shows a high signal intensity lesion in the metaphysis with cortex is spared</td>
<td>Section studied a hypocellular area in the center surrounded by areas of osteoclast type of giant cells and hypercellular fibrous areas in the periphery</td>
</tr>
</tbody>
</table>

CT: Computed tomography, MRI: Magnetic resonance imaging
The CT scan typically shows the typical nidus and the histopathological sections confirm a nidus with interlacing woven bone within a vascularized connective tissue, the study correlating perfectly. CT scan-guided RFA can be performed for ablation of the nidus in femur in future. Dr. Bhavin Jankharia is a skilled radiologist in providing RFA therapy in India.

**Osteoblastoma**

Two cases were reported. The presenting symptom was pain and the age group was between 12 and 23 years of age. One lesion was found in L3 vertebra and one in the fibula. Osteoblastoma is distinguished from the osteoid osteoma by the larger size of the nidus more than 2 cm, the absence of a surrounding area of reactive bone formative, and the lack of intense pain. The majority of osteoblastomas enlarge slowly, with consequent remodeling of bone around the lesion. Two cases underwent tumor tissue curetted and bone grafting was done (Figures 3 and 4).

CT scan shows a lytic mass lesion in fibula expanding the cortex. The tumor tissue was curetted and bone reconstruction was made. The histopathology section shows interlacing network of wide and broad osteoid woven bone rimmed by osteoblasts. The correlation study holds good here.

**Chondroma**

Chondroma is a common benign cartilaginous tumor that occurs most frequently in the small bones of the hands and feet, particularly the proximal phalanges. They begin in the spongiosa of the bone, from which they expand and thin out the cortex. The tumors are notoriously insensitive to therapy. Cartilage tumors have a tendency to be aggressive with each surgical interference. The T2-weighted magnetic resonance imaging (MRI) shows high signal intensity with a lobulated outline. MRI can delineate the medullary extent. CT can identify the calcification of cartilage. About 30% of chondromas are multiple. Ollier disease and Maffucci syndrome have an increased risk of developing chondrosarcoma. It is named after Louis Leopold Ollier. Microscopically, chondromas are composed of mature lobules of hyaline cartilage. Foci of myxoid degeneration, calcification, and endochondral ossification are common. A majority of enchondromas remain asymptomatic and require no treatment. If necessary, a curettage and bone grafting can be performed at a later time (Figures 5 and 6).

Two cases were reported. The presenting symptom was soft tissue swelling and the age group was between 18 and 28 years. Two lesions were reported from phalanges. X-ray of the left-hand ring finger shows an area of translucency expanding the cortex and with a popcorn calcification distally. For the two cases, curettage and bone grafting were performed. Sections studied show areas of cartilaginous tissue in lobules with areas of calcification.
The radiographic findings correlated with histopathology findings.

**Osteochondroma**

Osteochondroma is the most frequent benign bone tumor. The most common locations are the metaphyses of the lower femur, upper tibia, upper humerus, and pelvis. The radiographic appearance of osteochondroma is the tumors grow out in a direction opposite to the adjacent joint.

The most common symptom related to osteochondroma is a nontender painless mass, osseous deformity, fracture, vascular compromise, neurologic sequelae, overlying bursa formation, and malignant transformation. The average age of the patient at onset is approximately 10 years. The bulk of the lesion is made up of mature bone trabeculae located beneath the cartilaginous cap and containing normal bone marrow. The three-dimensional imaging CT shows cortical and marrow continuity of the lesion and parent bone in osteochondromas. Growth of osteochondroma continues till skeletal maturation is complete. Fourteen cases were reported with H/O soft tissue swelling and vague pain. Nine cases were male patients and five cases were female patients. Six cases were from the femur, five from the humerus, one from the tibia, one from pubic ramus, and one from fibula. The presenting age group was between 8 and 12 years of age (Figures 7 and 8).

**Treatment**

Most cases needed no absolute indication for surgery except for cosmetic reasons and complications. Fourteen cases underwent surgery. Larger symptomatic lesions were resected at their base where there is continuity to underlying bone. Pedunculated lesions are more easily removed. Sections studied show a cartilaginous cap overlying broad bands of bone trabaculae. In all the cases, the radiographic findings correlated with histopathology findings.

**Chondroblastoma**

Chondroblastoma is also referred to as Codman tumors, arises in the epiphysis or apophysis of a long bone in young patients. In 1931, this lesion was described by Ernest Armory Codman an American. Nearly 50% of chondroblastoma occurs predominantly in males under 20 years of age. Clinical presentation includes joint pain, muscle wasting, tenderness, and swelling as a local mass. It usually arises in the distal end of the femur, proximal end of the humerus, and proximal end of the tibia. MRI shows, T1: Lesion itself is of low to intermediate signal, T2/short T1 inversion recovery: Lesion is of intermediate to high signal. Microscopically, the presence of small zones of focal calcification is present with cellular areas of mononuclear cells. These zones range from a network of thin lines (“chicken wire”) to obvious deposits surrounded by giant cells. Helpful features which suggest a clear cell chondrosarcoma include: Older age, larger mass, absent adjacent bone edema, and high T2 signal in MRI. Two cases were reported: One lesion involved lower end of the femur and one upper end of the fibula (Figures 9 and 10).
The two cases were treated with curettage and packing of the resulting cavity with bone cement. X-ray femur showing an area of translucency with calcification. X-ray right femur showing an area of translucency with calcification. Sections studied show highly cellular areas of mononuclear cells and giant cells with chicken-wire calcification. RFA has also been used currently for therapy. The radiographic findings correlated with histopathological section findings.

**Chondromyxoid Fibroma**

Chondromyxoid fibroma of bone is a benign tumor of cartilaginous origin. Most chondromyxoid fibromas are located in the metaphyseal region of long bones (60%). The tumor consists of chondroid, myxomatous areas with giant cells. It usually occurs in a long bone around knee joint of a young adult. Radiographically, a radiolucent, eccentric space occupying lesion is seen in the metaphysis. Cortex is expanded. Grossly, it is solid and yellowish white or tan tissue, replaces bone, and thins the cortex. Microscopically, it comprises hypocellular lobules with a myxochondroid appearance, separated by intersecting bands of highly cellular tissue composed of fibroblast-like spindle cells and osteoclast-type of giant cells.

T2-weighted MRI of lower femur shows a high signal intensity lesion in the metaphysis with cortex is spared. Two cases underwent *en bloc* excision and bone grafting. Section studied shows a hypocellular area in the center surrounded by areas of osteoclast type of giant cells and hypercellular fibrous areas in the periphery. Radiographic features correlated with histopathological findings (Figures 11 and 12).

None of the benign osteogenic and cartilaginous tumors turned malignant after careful study and follow-up after treatment so far (Table 4).

![Figure 9: Translucent lesion involving lower end of femur with a calcification seen distally](image)

![Figure 10: Cellular lesion with mononuclear cells with osteoclast type of giant cells and chicken wire calcification.](image)

![Figure 11: T2 Weighted MRI of lower femur shows a high signal intensity lesion in the metaphysis with cortex is spared](image)

![Figure 12: Lobules have a hypocellular center and increased cellularity at the periphery](image)
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Table 4: Final outcome of the study of benign bone tumors

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Surgery done</th>
<th>Cure rate (%)</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoid osteoma</td>
<td>Six cases underwent surgery. The nidus was surgically removed with a margin</td>
<td>100</td>
<td>Two cases are attending follow-up</td>
</tr>
<tr>
<td>Osteoblastoma</td>
<td>Two cases underwent tumor tissue curetted and bone grafting was done</td>
<td>100</td>
<td>No cases reported for follow-up</td>
</tr>
<tr>
<td>Chondroma</td>
<td>Two cases underwent curettage and bone grafting</td>
<td>100</td>
<td>One case reported for follow-up</td>
</tr>
<tr>
<td>Osteochondroma</td>
<td>Fourteen cases underwent surgery. Larger symptomatic lesions were resected at their base where there is continuity to underlying bone. Pedunculated lesions were more easily removed</td>
<td>100</td>
<td>Two cases reported for follow-up</td>
</tr>
<tr>
<td>Chondroblastoma</td>
<td>Currettement with bone cement filling was done for the two cases</td>
<td>100</td>
<td>No cases reported for follow-up</td>
</tr>
<tr>
<td>Chondromyxoid fibroma</td>
<td>Two cases underwent en bloc excision and bone grafting was done</td>
<td>100</td>
<td>One case reported for follow-up</td>
</tr>
</tbody>
</table>

DISCUSSION

The presentation of chondromyxoid fibroma is interesting as it occurs in the second and third decades, with 75% of cases occurring before the age of 30 years.1,26,27 The tumor comprises a variable combination of chondroid, myxoid, and fibrous tissue components organized in a pseudolobulated architecture.28 In osteoid osteoma, the pain relief after treatment is so dramatic that the patient realizes on recovery from anesthesia that the lesion has been removed. In future, non-invasive procedure such as CT-guided RFA in osteoid osteoma, osteoblastoma, and chondroblastoma may have a promising role. Treatment of osteoid osteoma with RFA has been extremely successful, with negligible complications.29,30 Osteochondroma was the most common type of tumor, occurred commonly in male children. The peak incidence was in the second decade and the most common site was the lower extremity, particularly in the femur. Giant cells were found considerably in chondroblastoma and chondromyxoid fibroma leading to a suspicion of giant cell tumor. Enchondromas have similar histopathological appearance of low-grade chondrosarcoma. In these cases, imaging modality provided the final diagnosis. Highly cellular chondroid tumors have high signal intensity in T2-weighted MRI. Gadolinium-enhanced images help to differentiate between viable tumor, reactive edema and necrosis and guide the biopsy site. Twenty-eight cases underwent surgery. Six cases turned for follow-up. The cure rate was 100% with the team approach of radiologists, clinicians, and pathologists.

CONCLUSION

The histopathology is the final tool for the diagnoses of various types of benign tumors of bone both osteoid-producing and cartilage-producing tumors. The study also explains the pain in diagnosing benign and malignant cartilaginous tumors located peripherally in the bone that is a challenging task in histopathology reporting. Histopathology provides the final verdict for further treatment of the patient. The study provides the importance of other medical faculty, the surgeon, and radiologist to work as a team for a successful outcome. We correlated the histopathological findings with radiological findings. This resulted in perfect correlation between the histopathology study and radiology study.

REFERENCES


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Source of Support: Nil, Conflict of Interest: None declared.
Abstract

Introduction: In developing countries, chronic suppurative otitis media (CSOM) accounted for 60-80% of middle ear disease. CSOM is a disease affecting, especially people with poor health, hygiene, and nutrition worldwide. Up to one-third of the population in developing countries has their quality of life affected by CSOM and its precursors. In children in developing countries CSOM is the most common cause of hearing impairment.

Aim: The aim is to study the long-term hearing stability in patients who undergoing ossicular reconstruction using auto- or homo-graft ossicles taken from CSOM.

Methods: Fifty cases of unsafe CSOM who underwent a modified radical mastoidectomy or radical mastoidectomy for their disease process were taken up for the study.

Results: Out of 50 patients, 34 were male and 16 were female prominent age group being 20-45, all the patient had ear discharge and hard of hearing. Removed ossicles are examined and found pathology from inflammatory cell infiltration to sequestrum formation, and long process of incus is most common to affect.

Conclusion: The long process of the incus is the most commonly eroded part of an ossicle in unsafe CSOM. Bone absorption is the most frequent pathological change and is usually observed where the granulation, inflammatory, or connective tissue with fibroblast is adjacent to the ossicle.

Key words: Cholesteatoma, Chronic suppurative otitis media, Ossicles

INTRODUCTION

Chronic suppurative otitis media (CSOM), a common condition in otorhinolaryngology, is characterized by chronic, intermittent, or persistent discharge through a perforated tympanic membrane. Poor living conditions, overcrowding, poor hygiene, and nutrition have been suggested as the basis for the widespread prevalence of CSOM in developing countries.1,2

Tubotympanic type of CSOM is called safe type because the rate of complication is very low and is usually not associated with cholesteatoma formation. Ossicular chain involvement is found in both safe and unsafe type of disease. In safe type, though the involvement of ossicular chain is less common, still significant numbers of patients are having hearing deterioration due to it. The tubotympanic types are mainly manifested with hearing loss, which may be due to perforation in the tympanic membrane or ossicular chain erosion/fixation. Mechanism of ossicular erosion in noncholesteatomatous middle ear disease is overproduction of cytokines tumor necrosis factor (TNF) alpha, interleukin-2 (IL-2), fibroblast growth factor, and platelet-derived growth factor, which promotes hypervascularization, osteoclast activation, and bone resorption causing ossicular damage.3

Management of CSOM has witnessed a profound change over the past 10 decades. Middle ear reconstruction is done after successful removal of the disease. For a successful ossicular reconstruction, an air-filled middle ear and a functioning eustachian tube are important prerequisites.
Grafts and biomaterials chosen for use in middle ear reconstruction should not induce a sustained foreign body reaction, neither should extrude or biodegrade.

**Aim**
The aim is to study the long-term hearing stability in patients who undergoing ossicular reconstruction using auto- or homo-graft ossicles taken from CSOM.

**MATERIALS AND METHODS**
This case series study was conducted in Department of ENT at Government Theni Medical College. A total of 55 cases of unsafe CSOM who underwent a modified radical mastoidectomy or radical mastoidectomy for their disease process were taken up for the study. All the ossicles were studied grossly under ×4 magnification while performing surgery. The ossicle in the cases where their chain was completely intact was not removed during surgery and hence was not studied histologically. Only 35 ossicles (24 incus, 11 malleus) were studied histologically. They were removed partially or completely as a part of the surgical procedure on such cases. The stapes was never removed or studied histologically. Whenever possible, biopsy was also taken from attic, aditus, antrum, and sinus tympani. The removed ossicle and biopsy materials were preserved in separate formalin containers. The ossicles were decalcified before sectioned.

**RESULTS**
Cholesteatoma and granulation tissue are the specific pathologies in atticoantral disease. Although cholesteatoma is invariably associated with granulation tissue, there may be only granulation tissue in active mucosal disease (Figure 1).

**Gross Pathology**
Erosion of the bone was most commonly seen in the long process of incus (54%) (Image 1). It was followed by erosion of handle of the malleus, body, and short process of the incus, in order of frequency. Whenever the stapes superstructure was eroded, the incus and malleus were markedly disrupted ossicular surface looked pitted under ×4 magnification in 5 incus and 2 malleus. Cholesteatoma was not always associated with ossicular disruption, and even in the absence of cholesteatoma, the ossicular disruption was present. Nearly 7% of cases with mainly cholesteatoma 90% with only granulations or chronic inflammation and 96% with both cholesteatoma and granulations or chronic inflammation in the middle ear cleft showed the evidence of bone destruction on gross examination in one or all the ossicles (Tables 1 and 2).

**Histopathology**
Totally, 2 out of the 35 ossicles studied histopathologically looked intact on gross examination under ×4 magnification. They were, however, studied histopathologically while they were removed completely or partially as a part of the surgical procedure because the ossicular chain in these cases was not intact one of the two ossicles showed bone changes
on histological study. All the ossicles which looked pitted on gross examination showed bone changes. Only one ossicle was absolutely normal histologically. Bone absorption was the most common histopathological change and was found in 84% ossicles (Image 2). It was followed by infiltration by inflammatory cells in the bone spaces. Keratinized stratified squamous epithelium was seen in the mucosal covering of 4 (12%) ossicles. Proliferation of fibroblast was present just adjacent to the surface in 7 (19%) ossicles. In 12% ossicles, there was evidence of sequestrum. New bone formation was observed in 20% ossicles (Tables 2 and 3).

**DISCUSSION**

Subtotal perforations were the most common type recorded in our series. These may be due to aggressive and recurrent middle ear disease due to inadequate and improper medical therapy, lack of awareness about aural hygiene and unavoidable delays in scheduling surgery. Some of the perforations had only a small remnant of tympanic membrane and can be called total perforation.

Subtotal perforations are associated with defective handle of the malleus and long process of the incus while the posterior perforation mostly involves the long process of the incus. In Austin’s series, the most common ossicular defect was absence of long process of the incus (59.2%), followed by loss of the incus and superstructure of stapes (23.2%) and necrosis of the incus, superstructure of the stapes and malleus. The malleus was markedly affected along with incus. Granulation tissue exhibits their impact equivocally with cholesteatoma (8.2%).

Cholesteatoma has the property of bone erosion. A number of theories have been propounded explaining the mechanism of bone erosion by cholesteatoma such as pressure, bacterial, enzymatic, hyperemic, chemical, and immunological theories. Site of cholesteatoma has an influence on the pattern of ossicular damage.

Ferlito et al. suggested that the destructive property of cholesteatomas - the bone erosion is caused by the production of collagenase by the components of squamous and fibrous epithelial tissues. It is not properly demonstrated yet whether mineralized bone can be absorbed by collagenase. Other agents were incorporated, such as TNF, IL-1α and prostaglandins, to the hypothesis of bone absorption by biochemical action, exclusively played by collagenolytic enzymes.

**CONCLUSION**

The long process of the incus is the most commonly eroded part of an ossicle in unsafe CSOM, followed by handle and head of the malleus. Bone absorption is the most frequent pathological change and is usually observed where the granulation, inflammatory, or connective tissue with fibroblast is adjacent to the ossicle. The high incidence of bone changes seen in the ossicles in unsafe CSOM suggests that their retention during mastoid
surgery may not be as beneficial in producing the long-
term results.

REFERENCES


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Clinical Outcome of Borderline Subdural Hematoma with 5-9 mm Thickness and/or Midline Shift 2-5 mm

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Abstract

Introduction: Patients with a subdural hematoma (SDH) and midline shift (MLS) of <10 mm on the computed tomography (CT) scans and with a Glasgow coma scale (GCS) score of 15 initially might be treated conservatively under close observation, reserving urgent craniotomy, and evacuation of the SDH for those with deteriorating neurological conditions.

Aim: The aim is to study the clinical outcome in management of borderline acute subdural hematoma with 5-9 mm thickness and/or MLS 2-5 mm.

Materials and Methods: Patients with head injury and acute SDH were screened. SDH thickness 5-9 mm, MLS 2-5 mm, GCS score >8, time since injury within 6 h of trauma, volume of contusion <20 ml, and loss of consciousness <1 h duration were included in the study.

Results: SDH thickness and outcome, it was observed that out of 17 cases with SDH thickness <5 mm, 15 were alive and 2 cases expired with a survival rate of 88%. In 83 patients with SDH thickness > 5 mm, survival rate was 76% with 63 survivors and 20 deaths. In the group with MLS 2-5 mm and SDH thickness <5 mm, there was only one death among 17 patients with 16 survivors. In the group with MLS 2-5 mm and SDH thickness 5-9 mm, there were 19 deaths with 9 survivors. The survival rate was 47%.

Conclusion: The mortality rate among those taken up for surgery after initial conservative management was significantly higher and thus emphasizing the need for close monitoring of conservatively managed patients and also to take up for primary surgery at the slightest degree of suspicion regarding conservative management in patients with associated contusion or subarachnoid hemorrhage.

Key words: Midline shift, Subdural hematoma, Trauma

INTRODUCTION

Patients with a subdural hematoma (SDH) and midline shift (MLS) of <10 mm on the computed tomography (CT) scans and with a Glasgow coma scale (GCS) score of 15 initially might be treated conservatively under close observation, reserving urgent craniotomy, and evacuation of the SDH for those with deteriorating neurological conditions.¹ A smaller degree of MLS was tolerated by patients with an GCS score of <15: A shift of more than 5 mm on the initial CT scans predicted an exhaustion of the cerebral compensatory mechanism within 3 days of injury Mathew et al. recommended conservative management with a MLS <10 mm in conscious patients, but Wong recommended it only on those patients with a GCS score of 15. Wong found that a MLS >5 mm in patients with a GCS score <15 was significantly related to conservative management failure due to exhaustion of the cerebral compensatory mechanisms within 3 days of injury. Therefore, he recommended that the minimal hospital stay for patients with small SDHs under conservative management should be 3 days. He also found that the thickness of the hematoma was non-predictive of the outcome.²

It is found that patients with a TICH volume of <15 ml, a MLS of <5 mm, an open perimesencephalic cistern on
Vignesh, et al.: A Study on Borderline SDH

CT scans, a GCS score of 12 or more, and an absence of lateralizing signs may be treated conservatively and expected to make a good recovery.¹

Dent et al. reviewed all patients with an acute SDH admitted over a 6-year period to a single trauma center and found that 61% of the patients received conservative management. The patients conservatively managed tended to fare better, but they also had better initial GCS scores, smaller hematomas, less shift of midline cerebral structures, less associated brain injuries, and less cerebrospinal fluid basal cistern effacement.³

Small subsets of patients fail with non-operative management and subsequently require surgical decompression for progression of a pre-existing lesion or delayed presentation of new lesions. Failure of nonoperative management has been associated with the timing of initial post-injury CT scans, hematoma location and volume, and the presence of edema around the hematoma, and physiologic variables such as hypotension, hypoxia, and coagulopathy of the variables investigated, and only anatomic location of injury was found to be predictive of early failure of nonoperative management. Frontal intraparenchymal hematomas are particularly prone to early failure. Clinical examination and intracranial pressure (ICP) monitoring are equally important in detecting failure and should be an integral part of non-operative management.⁴

Aim
The aim is to study the clinical outcome in management of borderline acute subdural hematoma with 5-9 mm thickness and/or MLS 2-5 mm.

MATERIALS AND METHODS
The study was conducted at Department of Neurosurgery at the Madras Institute of Neurology, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai. Institutional Ethics Committee approval and informed consent from patients’ relatives were obtained. Patients who were admitted with head injury and acute SDH were screened. Inclusion criteria: Age-adults (13 years and above), SDH thickness 5-9 mm, MLS 2-5 mm, GCS score >8, time since injury within 6 h of trauma, volume of contusion <20 ml, and loss of consciousness <1 h duration. Exclusion criteria: GCS score <9, presence of bradycardia, pupillary asymmetry, presence of paucity of movements on one side or hemiplegia, chronic alcoholics, severe life-threatening musculoskeletal/spine/thoracoabdominal injuries, evidence of severe brain stem dysfunction, and patients who are unwilling to participate in the study.

Head injury patients who were admitted at our hospital with borderline SDH as per the inclusion and exclusion criteria were included in the study. Data regarding the various parameters such as age, sex, mode and time of injury, clinical examination pertaining to GCS, pupils, neurological deficit, pulse, blood pressure, respiration, and CT findings were recorded. Renal function tests, blood sugar, serum electrolytes, complete blood count, coagulation profile, and blood grouping was done. Patients were evaluated and treatment was done according to brain trauma foundation guidelines. Neurological status of the patient was monitored intensively. Treatment was altered according to changes in neurological status or CT scan.

RESULTS
In this study, 55 patients had SDH of thickness 5-9 mm, 17 had MLS 2-5 mm with SDH thickness <5 mm, and 28 patients had both SDH thickness 5-9 mm and MLS 2-5 mm. Thus, in the majority SDH, thickness was in the 5-9 mm range (83%). Significant MLS with a small SDH was present only in a minority (17%) (Figure 1).

The most common associated injury has been found to be an ipsilateral intraparenchymal contusion in 33 patients, and contralateral contusions were found in 12 patients. There was associated subarachnoid hemorrhage (SAH) in 15 patients.

Primary surgical intervention was done in 3 cases where contusions were the indication rather than the SDH itself with an anticipated worsening of the condition of the patient. The most common indication for surgical intervention was fall in GCS score after initial conservative therapy in this study among 12 cases. Increase in MLS was the second most common indication and occurred in 7 cases. The least common indication was increase in SDH thickness which occurred in only 4 patients (Figure 2).
In this study, among 100 patients, 97 were treated primarily conservatively. There was failure of non-operative treatment in 23 patients among the 97, requiring secondary surgical evacuation. Of these 23 patients, 9 patients were alive at 30 days and 14 patients had died. In the conservative group of 74 patients at 30 days, 66 were alive and 8 were expired. In the event of failure of conservative treatment, in those patients requiring surgery, 39% survived and 61% expired. In the group treated by primary surgery, all 3 patients survived with good outcome (Table 1).

In this study, among 41 patients with SDH only, death occurred in only 2 patients with 39 surviving patients at a survival rate of 95%. Of the 32 patients with SDH and ipsilateral contusions, 23 patients were alive and 9 patients expired with a survival rate of 50%. In 15 patients with SDH and SAH, 10 patients survived and 5 expired with a survival rate of 67%. Of all the cases, patients with SDH alone had a good prognosis and those with SDH and contralateral contusion had a relatively poor prognosis (Table 2).

No deaths were observed among patients in the SDH only group who were operated. In the SDH with contusion group, of the 14 patients operated, there were 11 postoperative deaths with a survival rate of 21%. In the SDH with SAH group among the 4 patients, operated 3 expired with a survival rate of 25%. However, these statistics were not significant on applying the chi-square test (Table 3).

In the conservatively managed groups, the SDH only, SDH with contusion, and SDH with SAH had 2, 4, and 2 deaths, respectively. The mortality rates were 6% in SDH only group, 13% in SDH with contusion group, and 18% in SDH with SAH group. Thus, mortality rates were 2-3 times higher when SDH had an associated contusion or SAH.

Comparing the SDH thickness and outcome, it was observed that out of 17 cases with SDH thickness <5 mm, 15 were alive and 2 cases expired with a survival rate of 88%. In 83 patients with SDH thickness >5 mm, survival rate was 76% with 63 survivors and 20 deaths (Table 4).

In the group with MLS 2-5 mm and SDH thickness <5 mm, there was only one death among 17 patients with 16 survivors. In the group with MLS 2-5 mm and SDH thickness 5-9 mm, there were 19 deaths with 9 survivors. The survival rate was 47% (Table 5).

On comparing the MLS, in the group with MLS and SDH <5 mm, the mortality was 6% while patients with MLS
and SDH 5-9 mm had a mortality of 53%. On applying the Fischer’s test, the $P < 0.0001$ is statistically significant.

On comparing MLS with isolated SDH, overall mortality was 5% in the group with MLS <2 mm. Mortality was significantly increased in the presence of MLS. On applying Fischer’s test, this was statistically significant.

Of the 100 patients, majority (78%) were alive at 30 days whereas 22% expired (Figure 3).

**DISCUSSION**

Morbidity and mortality after an acute subdural hematoma are the highest of all traumatic mass lesions. This poor outcome results largely from associated parenchymal injuries and subsequent intracranial hypertension.\(^5\,6\)\(^7\)

In study done by Kotwica et al., on analysis of operative timing and outcome, no benefit revealed when surgery was performed within first 4 h. However, the patients operated on later than 4 h after trauma had smaller MLS and less pronounced brain contusion. It should be taken into account that some patients who could benefit from early surgery - those with quickly developing hematomas and intracranial hypertension had no chance to arrive and died in peripheral hospitals. Despite our results, we advocate an urgent evacuation of hematoma, as early as possible after trauma. Significant correlation was found between MLS, cerebral contusion on CT scans, and results of surgery. Patients with bigger MLS or presence of focal cerebral contusion revealed higher mortality and worse outcome than patients with smaller shift and no cerebral contusion visible on CT pictures.\(^7\)

In the study done by Wilberger et al., the time from injury to operative evacuation of the acute SDH in regard to outcome morbidity and mortality was not statistically significant even when examined at hourly intervals although there were trends indicating that earlier surgery improved outcome. The findings of this study support the pathophysiological evidence that in acute SDH, the extent of primary underlying brain injury is more important than the subdural clot itself in dictating outcome; therefore, the ability to control ICP is more critical to outcome than the absolute timing of subdural blood removal.\(^8\)

Other significant factors associated with poor outcome are interval between injury to surgery, hypoxia, hypotension, post-traumatic seizures, focal neurological deficit, obliteration of basal cisterns, thickness of hematoma, and MLS. Trauma coma data bank cohort study showed hypoxia in 46% of patients and mortality in 40% of patients.\(^9\)

**CONCLUSION**

Our study had mainly focused on borderline SDH. According to our study thickness of SDH alone, was not statistically significant in determining the outcome. SDH when associated with MLS had very significant influence on both mortality and functional outcome. Patients with greater MLS had worse outcome than those with a lesser MLS. SDH with associated contusion or SAH has a worse prognosis than SDH alone. Early surgery in these cases may improve the prognosis. The mortality rate among those taken up for surgery after initial conservative management was significantly higher and thus emphasizing the need for close monitoring of conservatively managed patients and also to take up for primary surgery at the slightest degree of suspicion regarding conservative management in patients with associated contusion or SAH. The threshold for decision-making toward primary surgical management should be lower for patients with moderate head injury as this group may benefit more from aggressive management. Furthermore, if the GCS scores fall further, the prognosis becomes dismal and the final outcome is bleak.

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Histomorphological Study of Ovarian Tumors: An Institutional Experience of 2 Years

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Abstract
Background: Ovarian tumors have various histomorphological patterns. Histopathological examination plays an important role in classifying ovarian tumors for a better prognosis. Ovarian tumors are classified into surface epithelial tumors, germ cell tumors, and sex cord-stromal tumors. This study was done to know various histomorphological patterns of ovarian tumors.

Aims and Objectives: The aim of this study was to study the histopathology of lesions of the ovary with regard to the standard classification of ovarian tumors and to determine the relative incidence of these histomorphological patterns among different age groups of patients.

Materials and Methods: A 2-year prospective study carried out at SVS Medical College and Hospital, Mahabubnagar, Telangana, in the Department of Pathology from June 2015 to May 2017. On microscopy, histomorphological patterns of ovarian tumors were noted. Sections were given and slides were stained hematoxylin and eosin, and special stains were done wherever necessary.

Results: Out of total 50 cases, 82% were benign and 18% were malignant. Histologically, surface epithelial tumor was the most common (80%), followed by germ cell tumors (16%) and sex cord-stromal tumors (4%). Age incidence of benign tumors was age group of 21-40 years and malignant 41-65 years.

Conclusion: Surface epithelial tumors were most common followed by germ cell tumors. The majority of tumors were reported among the age group of 35-45 years.

Key words: Microscopy, Ovarian tumors, Surface epithelial tumors

INTRODUCTION

Ovarian neoplasm is the most common tumors among women; fortunately, 90% are benign.¹ Ovarian cancer is the most frequent cause of death from gynecological cancers and the fourth most frequent cause of death from cancer in women in Europe, United States, and Eastern India.²,³

Main etiology behind ovarian tumors is risk factors that are increasing age, positive family history, increase the age of reproduction, high socioeconomic classes, and nulliparity.⁴ Ovarian tumors are insidious in onset and usually diagnosed at a late stage. They are rare in young age group.⁵ They commonly present with abdominal pain, a lump, or menstrual irregularities.⁶

Depending on the type of the ovarian tissue where the neoplasm develops, ovarian tumors are classified into three primary classes: Epithelial tumors 90%, germ cell tumors 3%, and sex cord/stromal tumors 6%.⁷,⁸

The purpose of this study was to assess the incidence, morphological, gross, histopathological pattern, and incidence of the age distribution of ovarian tumors in SVS Medical College.

MATERIALS AND METHODS

The present prospective 2-year study was carried out in the Department of Pathology, SVS Medical College,
Mahabubnagar, Telangana, India, from June 2015 to May 2017. The samples included the specimens from the Department of Gynecology at our institute along with specimens from outside.

The specimens were allowed to fix in 10% buffered formalin for 24-48 h. After fixation, multiple bits were taken from representative areas of the tumor and the accompanying tissue. Special attention was given to solid areas adjacent to the ovarian surface and papillary projections. They were processed for histopathological examination, and paraffin blocks were made. The blocks were cut at 3-5 μm thickness and stained with hematoxylin and eosin stain; special stains were carried out whenever needed.

RESULTS AND OBSERVATIONS

A 2-year prospective study of ovarian tumors was studied at the Department of Pathology, SVS Medical College, Mahabubnagar, Telangana, from June 2015 to May 2017.

Out of 50 ovarian tumors included, 82% (41/50) were benign and 18% (9/50) were malignant (Table 1).

Surface epithelial tumors were most common (80%) followed by germ cell tumors (16%) (Table 2).

Out of 40 cases of surface epithelial tumors, serous tumors comprised about 75% (30/40) and mucinous tumors about 25% (10/40) (Table 3).

Out of 40 cases of surface epithelial tumors, serous cystadenameos comprised about 62.5% (25/40), serous cystadenocarcinoma 12.5% (5/40), mucinous cystadenomas about 17.5% (7/40), and mucinous cystadenocarcinomas 7.5% (3/40).

Germ cell tumors comprised about 16% (8/50) all of them are mature teratomas (Table 2).

Sex cord-stromal tumors comprised only 4% (2/50) of all ovarian tumors (Table 2). In 2 cases of sex cord stromal tumors one is granulosa cell tumor and another is fibroma.

Age range from 15 to 65 years with majority of cases included, among 36-45 years, 30 (60%) cases. The youngest patient of our series was a female of 15 years with dermoid cyst, and the oldest patient was 65 years, a case of serous cystadenocarcinoma ovary.

Serous cystadenomas (20), mucinous cystadenomas (5), benign cystic teratomas (4), and granulosa cell tumor (1) were most common among 36-45 years of age group. One case of fibroma and 3 cases of benign cystic teratomas were among 46-55 years of age. Three cases of serous cystadenocarcinoma and 1 case of mucinous cystadenocarcinomas were among 56-65 years of age group (Table 4).

On gross examination, among 50 cases, cystic 78% (39/50), solid 16% (8/50), and both cystic and solid areas 6% (3/50) (Table 5).

Based on the site of involvement, majority of the tumors were unilateral about 76% (38/50) with right side predominance, bilateral in 24% (12/50).

<table>
<thead>
<tr>
<th>Table 1: Distribution of ovarian tumors</th>
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<tr>
<td>Tumor</td>
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<td>Malignant</td>
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<th>Table 2: Histomorphological pattern of ovarian tumor</th>
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<td>Type of tumor</td>
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<tr>
<td>Surface epithelial tumors</td>
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<tr>
<td>Germ cell tumors</td>
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<td>Sex cord-stromal tumors</td>
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<th>Table 3: Percentage distribution of surface epithelial tumors</th>
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<tr>
<td>Type</td>
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<td>Serous tumors</td>
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<td>Mucinous tumors</td>
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<th>Table 4: Age-wise distribution of cases</th>
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<td>Age in years</td>
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<th>Table 5: Consistency of ovarian tumors</th>
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<td>Consistency</td>
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DISCUSSION

In the present study, age range from 15 to 65 years with majority of cases included, among 36-45 years, 30 (60%) cases. The youngest patient of our series was a girl of 15 years with dermoid cyst (Figure 1) and the oldest patient was 65 years, a case of serous cystadenocarcinoma ovary (Figures 2 and 3).

In the present study, surface epithelial tumors were most common (80%) followed by germ cell tumors (16%). This is similar to the finding of Ahmad et al., Tejeswini, Panchal and Parikh, Jha and Karki, and Bhagyalakshmi et al. (Table 6).

In the present study, cases were reported in the age group of 15-65 years. Majority was, among 35-45 years, 30 (60%) cases. In Panchal and Parikh study, age ranged from 10 to 86 years with mean age of 39.1. Jha and Karki showed majority of the ovarian tumors, among 31-40 years age group, 43 (26.7%) cases.

Ovarian tumors were unilateral in 76% of cases (38/50) and bilateral in 24% (12/50) with the same findings of Panchal and Parikh study which showed unilateral tumors in 65 (78.3%) cases and bilateralism was seen in 18 cases (22%). In Janaki et al. study, most of the tumors were unilateral with right side predominance (66.42%).

Teratoma was the most common germ cell tumor found in this study constituting 16% of all ovarian tumors which is comparable to the results observed by Janaki M et al.

CONCLUSION

The histopathological examination of ovarian tumors is the most important method to differentiate between benign and malignant tumors and also in predicting the prognosis. This study concludes that surface epithelial tumors were most common followed by germ cell tumors. Majority of the tumors were reported among the age group of 35-45 years.

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Kancherla, et al.: Histomorphological Study of Ovarian Tumors: An Institutional Experience of 2 Years


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Clinical Study of Comparison Between Efficacy of Topical Sucralfate and Conventional Dressing in the Management of Diabetic Ulcer

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Abstract

Introduction: In this millennium where man has succeeded in deciphering human genetic code, the issue of management chronic wound continues an enigmatic challenge. Diabetic ulcers, particularly non-healing types, are one of the most common surgical issues. From time, immemorial doctors are trying different methods to treat this kind of ulcers. The difficulty in a chronic ulcer is its refusal to heal, whatever management given, especially diabetic ulcers.

Aim: To compare the efficacy of topical sucralfate with that of a control group using conventional dressings, in the healing of diabetic ulcers.

Materials and Methods: A total of 100 patients with diabetic foot ulcer participated in the present study. After undergoing a detailed clinical examination, and relevant investigations, the initial wound area was recorded after sharp debridement by measuring length x width (ulcer should be <15 cm × 15 cm). Both groups were subjected to once daily dressings. The patients were followed up on a daily basis for 3 weeks in both groups.

Results: In our study, it was observed that participants receiving sucralfate dressing had a better area of reduction of 41.97% (standard deviation [SD]: 7.41) as compared to the control group receiving only conventional dressing (normal saline dressing) in whom the mean area of reduction was 18.37 (SD: 13.43).

Conclusion: Sucralfate dressing is an effective modality to facilitate area of reduction of wound in patients suffering from diabetic foot ulcers and can be used as an adjunct to conventional mode of treatment (conventional dressings and debridement) for faster and better healing of diabetic ulcers.

Key words: Culture and sensitivity, Diabetic ulcer, Sucralfate dressing

INTRODUCTION

In this millennium where man has succeeded in deciphering the human genetic code, the issue of management chronic wound continues an enigmatic challenge. Diabetic ulcers, particularly non-healing types, are one of the most common surgical issues. From time, immemorial doctors are trying different methods to treat these kinds of ulcers. The difficulty in a chronic ulcer, is its refusal to heal;7 whatever management given, especially diabetic ulcers. The notion that ulcers should be kept dry, although still held by a considerable number of clinicians, is steadily losing ground. We now know that ulcers re-epithelialize8 much faster or develop granulation tissue faster when treated with dressings which allow moist wound healing.4 We recognize that occluding ulcers does not lead to infection. An ulcer care revolution is currently in the making. Many techniques have been tried over the centuries to heal diabetic leg ulcers. Although wound dressings have been used for at least two millennia, there exists no ideal dressing. Surgical dressing of wounds depends on tradition, training, and the surgeons...
own philosophy. During the past 2½ decades, a wide range of innovative dressings has been introduced. People have tried various non-conventional topical therapies in wound healing, such as Aloe vera, benzoyl peroxide, collagen,5,6 gentian violet, impregnated gauze, topical phenytoin, mercurochrome, oxygen therapy,7 sugar, and vinegar. Studies have also proven that topical sucralfate promotes healing of decubitus ulcers, venous stasis ulcers,8 traumatic wounds, burns, trophic ulcers and was seen to be superior management of diabetic ulcers.

**Aim**
To compare the efficacy of topical sucralfate with that of a control group using conventional dressings, in the healing of diabetic ulcers.

**MATERIALS AND METHODS**
This prospective study was conducted in Department of Surgery, Tirunelveli Medical College Hospital, Tirunelveli. Patients with long-standing diabetic ulcers (>2 weeks) were included, 50 patients in the study group, 50 patients in control group were randomly allocated.

**Inclusion Criteria**
Patients between 12 and 75 years of age, duration of the diabetic ulcer more than 2 weeks, the size of ulcer <15 cm × 15 cm, patients giving consent for topical sucralfate therapy.

**Exclusion Criteria**
Pulseless limb, immunocompromised patients, associated septicemia and osteomyelitis, skin malignancies, diabetic ketoacidosis, exposed bones, tendon, and charcot joint. Of 100 patients, 50 took treatment in the form of conventional normal saline dressings, and 50 took treatment with sucralfate dressing. Off-loading of pressure from the affected area and no antibiotics were used in both groups. Photographs of the ulcers before and after the dressings were taken, along with culture and sensitivity of the ulcers before and after the dressings. After undergoing a detailed clinical examination, and relevant investigations, the initial wound area was recorded after sharp debridement by measuring length x width (ulcer should be <15 cm × 15 cm). Both groups were subjected to once daily dressings. The patients were followed up on a daily basis for 3 weeks in both groups. The outcome that is the area of the target ulcer was measured by planimetry using a transparent graph sheet. Results were calculated using Student’s test.

**RESULTS**
The mean age in the study group was 58.88 years and in the control group was 62.28 years (Table 1).

Incidence of diabetic ulcers were more in males (57.00%) as compared to females (43.00%) (Table 2).

In this study, 27.00% of the ulcers were traumatic in origin. 73.00% were spontaneous in origin (Table 3).

30.00% of the patients had an ulcer on the dorsal surface of the forefoot, and 13.00% had ulcers on the medial malleoli. About 51.00% on the plantar aspect and about 6.00% on the lateral malleoli (Tables 4 and 5).

Negative culture in 46 patients in the study group whereas 49 patients in the control group still had a positive culture.

Diabetic ulcers in the study group had better mean percentage reduction of area 41.97% (standard deviation [SD]: 7.41) as compared to the control group which had mean percentage reduction of area was 18.37% (SD: 13.43) the difference in the mean 23.6% of reduction of area of the two groups was studied using independent sample T-test was found to be significant (P < 0.0001) (Table 6).
The mean time taken for complete healing of the ulcers was 2.68 weeks in the study group as compared to 5.36 weeks in the control group (Table 7).

**DISCUSSION**

Sucralfate, an oral gastrointestinal medication primarily indicated for the treatment of active duodenal ulcers, is also used for the treating gastroesophageal reflux disease and stress ulcers. It shows potential utility in the reduction healing of skin wounds. Sucralfate induces proliferation of dermal fibroblasts and keratinocytes. It also enhances prostaglandin E2 synthesis in basal keratinocytes, enhances interleukin-1-stimulated interleukin-6 release from fibroblasts. When applied to full-thickness wounds daily, sucralfate increased the thickness of granulation tissue. It also promotes rapid epithelialization of 2nd degree burns. A series of studies has shown that application of sucralfate to a wound enhances the wound repair process. Sucralfate has been demonstrated in preclinical studies to promote the granulation tissue formation and thus, promoting cutaneous ulcer healing. An ideal dressing is every surgeon’s desire, a dressing that promotes chronic ulcer healing without any complications. Successful wound dressing should keep the wound moist and be devoid of any adverse reactions such as infection, maceration, and allergy.

**CONCLUSION**

The wounds in participants treated with sucralfate dressing contracted more than wounds in the control group (41.97% vs. 18.37%; \( P \leq 0.0001 \) significant) which indicates sucralfate dressing is an effective modality to facilitate area of reduction of wound in patients suffering from diabetic foot ulcers and can be used as an adjunct to conventional mode of treatment (conventional dressings and debridement) for faster and better healing of diabetic ulcers.

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A Clinical Study on Transvaginal Ultrasonography and its Histopathological Correlation in the Diagnosis of Adenomyosis

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Abstract

Objective: The aim of this study is to evaluate the accuracy of transvaginal ultrasound (U/S) criteria in the diagnosis of adenomyosis and to correlate the U/S feature with histopathological results.

Materials and Methods: A total of 53 consecutive patients undergoing hysterectomy for adenomyosis were pre-operatively subjected to transvaginal U/S examination in this prospective study. The diagnosis was made if one or more of the following U/S findings were present: (1) A globular uterine contour; (2) poor endometrial-myometrial interface; (3) subendometrial echogenic linear striations; (4) myometrial anterior-posterior asymmetry; (5) myometrial cysts; and (6) a heterogeneous myometrial echotexture. These U/S findings were then compared and confirmed with the histopathological studies.

Results: The prevalence of adenomyosis was 23.4%. The sensitivity, specificity, positive predictive value, negative predictive value (NPV), and accuracy of transvaginal U/S for the diagnosis of adenomyosis were 80.5, 58.6, 61.2, 81.8, and 72.4, respectively. Subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry showed greater accuracy for the diagnosis of adenomyosis. Subendometrial echogenic linear striations had the best sensitivity, positive predictive value, and NPV for the diagnosis of uterine adenomyosis (89.2, 63.2, and 88.7%, respectively). The presence of a globular uterine configuration was the most specific sonographic feature (74.3%) but showed poor specificity (48.5%).

Conclusion: The presence of subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry on transvaginal ultrasonography supports the diagnosis of adenomyosis. Among the transvaginal U/S findings consistent with the diagnosis of adenomyosis, subendometrial linear striations had the highest diagnostic accuracy.

Key words: Adenomyosis, Histopathological, Linear striation, Transvaginal sonography

INTRODUCTION

Adenomyosis is a not so uncommon gynecologic disease defined as ectopic endometrial glands and stroma within the uterine myometrium.1 Patients may present with non-specific symptoms such as dysmenorrhea, dyspareunia, and menometrorrhagia. The plausible mechanism to explain adenomyosis is that it results from down growth and invagination of the basal layer of endometrium into the myometrium resulting in weakness of the myometrium caused by trauma such as cesarean section, dilatation and curettage, myomectomy, or other uterine surgeries.2 Adenomyosis is usually diagnosed using transabdominal ultrasonography (TAUS), transvaginal ultrasonography (TVS), or magnetic resonance imaging (MRI). Among these, TAUS has a limited diagnostic value for adenomyosis, whereas TVS has feasible ability to diagnose adenomyosis.3,4 As compared with MRI, TVS is more cost effective and available.5,7 Many ultrasound (U/S) features have been described for adenomyosis;8 they are (1) heterogeneous myometrium; (2) myometrial cysts; (3) subendometrial echogenic linear striations; (4) globular configuration; (5) myometrial anteroposterior asymmetry; and (6) poor
identification of the endometrial junction. The most specific transvaginal U/S diagnostic feature is a point of discussion. The present study aims to evaluate the accuracy of transvaginal U/S criteria in the diagnosis of adenomyosis and to correlate the U/S feature with histopathological results.

MATERIALS AND METHODS

A total of 53 consecutive patients attending the Department of Obstetrics and Gynecology of a teaching hospital attached to Kannur Medical College, Anjarakandy, Kannur, Kerala, India, were included in this study. All the patients were undergoing hysterectomy surgery for different diseases. The study period was between June 2011 and May 2014.

Inclusion Criteria
Patients presenting with dysmenorrhea, menometrorrhagia, cervical intraepithelial neoplasias, adnexal masses, genital prolapse, and endometrial hyperplasia or carcinoma and patients showing U/S features of adenomyosis were included in the study.

Exclusion Criteria
Patients with invasive type of neoplasias and malignant lymphadenopathy were excluded from the study. A thorough gynecological history was elicited. A TVS was done before surgery. The indications for hysterectomy were TVS examinations which were evaluated using a 7-9 MHz endovaginal probe. A single physician with 5-year experience as a sinologist was employed to all the U/S examinations in the study. U/S examination of the myometrial echotexture, uterine borders (regular or irregular), uterine size, and the presence of associated abnormalities (including leiomyomata) was observed. The diagnostic criteria used in the diagnosis of uterine adenomyosis in this study were one or more of the following criteria on TVS:1,3,5,6,8,9 (1) a globular-rounded configuration of the uterus (defined as a regularly enlarged uterus); (2) asymmetry of the anteroposterior wall of the myometrium; (3) poor definition of the endometrial-myometrial junction; (4) myometrial cysts (defined as a round anechoic area with a diameter of 1-7 mm); (5) hyperechoic, subendometrial, echogenic linear striations being located near the endometrial-myometrial interface; and (6) a heterogeneous myometrium (defined by the presence of an indistinctly defined myometrial area with decreased or increased echogenicity). A histopathological examination (HPE) was performed by a pathologist, who was blinded to the U/S findings. Macroscopically, adenomyosis was diagnosed by an enlarged uterus, a globular and/or asymmetrical uterus, and a dense, irregularly fasciculated myometrium with small cavities (0.5-10 mm). The disease was described as focal: Adenomyosis lesions restricted to one uterine wall. Histopathological features for adenomyosis used in the study were the presence of ectopic endometrial gland or tissue within the myometrium and located 2.5 mm beyond the endometrial-myometrial junction. Grading of adenomyosis was done as 1, 2, and 3 corresponded to the adenomyotic involvement of the inner one-third, two-thirds, and entire myometrium, respectively. Adenomyosis was also graded as mild, moderate, or severe according to the number of endometrial islets observed (1-3, 4-9, and 10 or more foci, respectively). Statistic analysis was performed using online socialsciencestatistics.com. Statistical significance was set at \( P < 0.05 \).

RESULTS

The age group of 53 patients ranged from 26 years to 76 years with a mean age of 46.40 ± 4.32. Among them, 38 patients (71.69%) were premenopausal and the remaining 15 were (28.30%) postmenopausal. There was no statistically significance in the mean age, gravidity, and parity of the 53 patients. The indications for hysterectomy were dysmenorrheal (\( n = 21 \)), menometrorrhagia (\( n = 11 \)), cervical intraepithelial neoplasias (\( n = 05 \)), adnexal masses (\( n = 06 \)), genital prolapse (\( n = 03 \)), and endometrial hyperplasia or carcinoma (\( n = 06 \)). The frequency of clinical symptoms was higher in patients with adenomyosis. The proportion of post-menopausal women with myomas was higher in patients without adenomyosis. Histologic examination showed that the overall prevalence of adenomyosis was 32.07% (17/53). Among them, 11 patients (64.70%) had diffuse adenomyosis and 6 patients (35.29%) had focal adenomyosis. The grades of adenomyosis were 1, 2, and 3 in 2, 5, and 10 cases, respectively. Other disorders with or without adenomyosis were leiomyoma (\( n = 09 \)), cervical intraepithelial neoplasias (\( n = 08 \)), adnexal disease (ovarian cancer and abscesses) (\( n = 06 \)), genital prolapse (\( n = 03 \)), and endometrial hyperplasia or carcinoma (\( n = 10 \)) (Table 1).

Out of 38 patients with negative HPE findings of adenomyosis, 30 showed U/S picture of globular uterine appearance (78.94%); 9/17 of HPE positive for adenomyosis were observed with similar U/S picture (52.94%). Poor differentiation of endometrium on U/S observation was found in 12/17 of the HPE-positive patients for adenomyosis, whereas 15/38 (88.23%) of the negative HPE patients (39.47%). Subendometrial echogenicity was found in 13/17 (76.47%) of the positive and 13/38 (34.21%) of the negative HPE patients. Myometrial anteroposterior asymmetry was found in 10/17 (58.82%) of the HPE positive and 11/38 (28.94%) of the HPE-negative patients in the study (Table 2). Table 2 reveals that when comparing...
each sonographic finding of adenomyosis, subendometrial echogenic linear striations, myometrial anterior–posterior asymmetry, and heterogeneous myometrial echotexture had higher statistical significance ($P < 0.05$) than other clinical signs of adenomyosis (Table 2).

**DISCUSSION**

Adenomyosis pathologically is a benign disease of the endometrium resulting in invasion and overgrowth into the myometrium (9). The frequency reported in the literature is from 8 to 85% \(^{1,5,6,9-12}\). In the present study, the prevalence of adenomyosis was 23.4%. Atri\(^{13}\) opined that the wide range of this frequency of adenomyosis may be due to the variation in the histologic criteria for its diagnosis, the degree of care with which pathologic specimens are observed, and the number of blocks of sampling specimens taken. In the present study, only four to eight blocks sectioned per specimen. The comparison of the sensitivity, specificity, positive predictive value (PPV), and negative predictive value of our study with the previous studies\(^{5,8,14}\) is shown in Table 3.

The sensitivity and specificity of 80.5 and 58.6, respectively, observed in the present study were comparable with a previous study.\(^{15}\) It is still debate whether MRI or TVU is the best tool to diagnose uterine adenomyosis. According to Ascher et al.,\(^{5}\) MRI is significantly better than TVU ($P < 0.02$) for diagnosing adenomyosis. However, Reinhold et al.\(^{6,10,15}\) found that TVU was as accurate as MRI in the diagnosis of uterine adenomyosis. Bazot et al.\(^{1}\) suggested that TVU and MRI have similar accuracy rates for the diagnosis of adenomyosis in the absence of associated disorders. The accuracy of TVU for the diagnosis of adenomyosis could be influenced in part by patient characteristics, such as an enlarged uterus.\(^{3}\) The variable accuracy of TVU for the diagnosis of adenomyosis may be because of differences in the main diagnostic criteria used. Heterogeneous myometrial echotexture is the major sonographic criteria used in most studies.\(^{5,7,10,12,14}\) However, Bazot et al.\(^{1}\) suggested that myometrial cysts had the highest specificity for adenomyosis. In this retrospective study, it was observed that the subendometrial linear striations had the best specificity and PPV, and this was consistent with the studies of Atri et al.\(^{13}\)

**CONCLUSION**

TVU finding of subendometrial echogenic linear striations, a heterogeneous myometrial echotexture, and myometrial anterior–posterior asymmetry has good specificity in the diagnosis of uterine adenomyosis. Among these TVU

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**Table 1: The patient characteristics with or without adenomyosis ($n=53$)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>HPE +ve for adenomyosis-17</th>
<th>HPE –ve for adenomyosis-38</th>
<th>Total</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>44.30±3.40</td>
<td>48.50±4.20</td>
<td>46.40±4.32</td>
<td>NS</td>
</tr>
<tr>
<td>Gravidity</td>
<td>2.40±1.6</td>
<td>2.8±1.3</td>
<td>2.6±1.5</td>
<td>NS</td>
</tr>
<tr>
<td>Parity</td>
<td>2.5±1.0</td>
<td>2.2±1.2</td>
<td>2.3±1.9</td>
<td>NS</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>15 (88.23%)</td>
<td>9 (23.68%)</td>
<td>24</td>
<td>0.031</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td>11 (64.70%)</td>
<td>25 (65.78%)</td>
<td>36</td>
<td>0.046</td>
</tr>
<tr>
<td>With myomas</td>
<td>4 (23.52%)</td>
<td>17 (44.73%)</td>
<td>21</td>
<td>0.045</td>
</tr>
<tr>
<td>Menopausal women</td>
<td>1 (5.88%)</td>
<td>13 (34.21%)</td>
<td>15</td>
<td>0.039</td>
</tr>
</tbody>
</table>

HPE: Histopathological examination

**Table 2: The correlation between U/S findings and HPE findings of the study ($n=53$)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Yes or No</th>
<th>HPE +ve for adenomyosis-17</th>
<th>HPE –ve for adenomyosis-38</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globular uterine appearance</td>
<td>Yes</td>
<td>9</td>
<td>8</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Poor differentiation of endometrium</td>
<td>Yes</td>
<td>12</td>
<td>15</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Subendometrial echogenicity</td>
<td>Yes</td>
<td>13</td>
<td>13</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Myometrial anteroposterior asymmetry</td>
<td>Yes</td>
<td>10</td>
<td>11</td>
<td>0.046</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>

NS: Not significant, U/S: Ultrasound, HPE: Histopathological examination

**Table 3: A comparative study of present with different authors**

<table>
<thead>
<tr>
<th>Authors</th>
<th>$n$</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siedler et al.(^{14})</td>
<td>80</td>
<td>63</td>
<td>97</td>
<td>71</td>
<td>-</td>
</tr>
<tr>
<td>Fedele et al.(^{8})</td>
<td>43</td>
<td>80</td>
<td>74</td>
<td>73</td>
<td>81</td>
</tr>
<tr>
<td>Ascher et al.(^{5})</td>
<td>17</td>
<td>52.9</td>
<td>66.6</td>
<td>90</td>
<td>20</td>
</tr>
<tr>
<td>Reinhold et al.(^{16})</td>
<td>100</td>
<td>86</td>
<td>86</td>
<td>71</td>
<td>94</td>
</tr>
<tr>
<td>Current study</td>
<td>53</td>
<td>80.5</td>
<td>58.6</td>
<td>61.2</td>
<td>81.8</td>
</tr>
</tbody>
</table>

PPV: Positive predictive value, NPV: Negative predictive value
findings, subendometrial linear striations had the highest diagnostic accuracy for recognizing adenomyosis, yielding better results than a heterogeneous myometrium.

REFERENCES


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A Study of Human Bite Injuries to the Face

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Abstract

Introduction: Human bites of the face present to the surgeon sometimes with a dilemma as to the method and timing of surgery. Often patients present with soft tissue defects as a result of the injury sustained. Reconstruction, therefore, becomes absolutely necessary to avoid psychosocial complications.

Aim: To analyze human bites injuries of the face and management of these wounds.

Materials and Methods: All patients who had human bites of the ear lip and nose accounting to about 39 cases were included in the study. The methods included obtaining a thorough history from the patients, thorough clinical examination and necessary investigations with appropriate surgical reconstruction.

Results: A total of 39 cases were included in the study, the most common site of injury was the ear accounting to about 67%, and primary reconstruction was done in about 15 (88%) cases in the trauma theatre. Secondary reconstruction was done in 2 (12%) cases in elective operation theatre.

Conclusion: Human bites are potentially dangerous wounds and constitute a significant cause of morbidity. Emergency physicians should be well acquainted with the evaluation and proper management of human bites to avoid complications.

Key words: Human bites, Management, Reconstruction surgery

INTRODUCTION

The true incidence of human bite injuries is difficult to estimate because the vast majority probably go unreported and do not seek medical attention. Of those reported, approximately 60% occur in the upper extremities, while another 15% occur in the head and neck region. The remainder occurs on the breasts, genitals, thighs, and other areas. Upper extremity bites most frequently occur on the dominant extremity. Head and neck injuries most commonly occur on the ears, nose, or lips.¹² Human bites of the face present to the surgeon sometimes with a dilemma as to the method and timing of surgery. Often patients present with soft tissue defects as a result of the injury sustained.

Reconstruction, therefore, becomes absolutely necessary to avoid psychosocial complications.³ In the US, human bites are the third most common next to dog and cat bites.³ People behave barbarically out of rage and go to this extreme of biting fellow human beings. Most of the bites have taken place under the influence of alcohol.³ Illiteracy is one of the major contributing factors for human bites. The most common bites were on the ear, the lip and the nose in that order. One of the main reasons for human bites is quarrel among family members.⁴ Ear loss whether total or partial leads to a lot of social stigmas and the victim camouflages the defect in public places. Lower lip defects can compromise the function of the oral sphincter. Nasal defects are easily noticeable, and the victims find it very difficult to socialize because of the nasal defect. We have discussed the various options available for the reconstruction of the ear, lip and nose defects. There is no specific classification available for human bites so far except for region wise classification.⁵

Aim

To analyze human bites injuries of the face and management of these wounds.
MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Plastic and Reconstructive Surgery, Government Rajaji Hospital, Madurai Medical College, Madurai. The patients with a history of human bites to the face who were admitted to the emergency ward were included in the study. All patients who had human bites of the ear, lip, and nose were included in the study. The methods included obtaining a thorough history from the patients, thorough clinical examination and necessary investigations with appropriate surgical reconstruction. Proper pre-operative planning was done. Pattern and template were made are per tissue loss. Immediately after admission, patients were given anti-tetanus prophylaxis. Wound swab was taken for culture and sensitivity. Thorough wound wash was given using Betadine, hydrogen peroxide, and saline. A course of antibiotics was started with injection Cefotaxime 1 g intravenous (IV) bd, injection Ampicillin 1 g IV bd, and injection Metronidazole 500 mg IV TDS for as long as the patient stayed in the hospital after which oral antibiotics was given to a total period of 5 days. In stable patients primary single staged repair was done or the first stage of staged reconstruction was done on the day of injury. In patients with associated injuries priority was given to life saving measures followed by secondary reconstruction. Procedures, outcomes, and complications were explained to the patients and informed written consent was obtained from all patients. Cases were followed up after 1 and 2 weeks then monthly for at least 3 months after the final stage of reconstruction.

RESULTS

A thorough examination of the bite wound in adequate lighting must be performed. The wound may be irrigated to facilitate the examination. The extent of damage to the soft tissue, depth of the bite, involvement of tendons, presence of infection or foreign bodies such as fragments of teeth must be assessed. Special care must be taken during the examination of fight bites, and examination must be performed in the closed fist position so as to passively flex the fingers, making it easier to assess the damage to the extensor tendons.

The data show that about 74% (N = 28) of injured belonged to 21-40 years. 21% (N = 9) of the patients belonged to 41-60 years age group. Only 5% (N = 2) of the cases were <20 years. About 95% (N = 37) of the patients were males. Only 5% (N = 2) were females (Table 1).

About 44% (N = 17) of the patients had completed their middle school education, and 33% (N = 13) of them had completed primary education. About 13% (N = 5) of them were illiterate. Only about 5% (N = 2) of the victims had completed secondary school education and graduation (Table 2).

The daily wages group had there were 92% (N = 36), and 8% (N = 3) of the patients were monthly salary group. About 32% (N = 13) of the victims were under the influence of alcohol at the time of injury. As per the history obtained from the victims, about 74% (N = 29) of the assailants were under the influence of alcohol at the time of injury.

The most common site of injury was the ear accounting to about 67% (N = 26) followed by a lip in about 18% (N = 7) of the cases. Nose was injured in 11% (N = 4) of the cases. Chin was injured in one patient, and only the Cheek was injured in another patient (Table 3).

The average hospital stay for the reconstruction of ear defects was 4.4 days. The average hospital stay for nose defects was 5 days and that for lip defects was 3.1 days. The hospital stays for Chin and Cheek injuries was 1.5 days (Table 4). The right side of the ear was involved.

<table>
<thead>
<tr>
<th>Table 1: Age incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
</tr>
<tr>
<td>≤20</td>
</tr>
<tr>
<td>21-40</td>
</tr>
<tr>
<td>41-60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Literacy status</th>
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</thead>
<tbody>
<tr>
<td>Literacy</td>
</tr>
<tr>
<td>Illiterate</td>
</tr>
<tr>
<td>Primary</td>
</tr>
<tr>
<td>Middle</td>
</tr>
<tr>
<td>Secondary</td>
</tr>
<tr>
<td>Graduate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Region of bite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region of bite</td>
</tr>
<tr>
<td>Ear</td>
</tr>
<tr>
<td>Lip</td>
</tr>
<tr>
<td>Nose</td>
</tr>
<tr>
<td>Chin</td>
</tr>
<tr>
<td>Cheek</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Average hospital stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
</tr>
<tr>
<td>Ear</td>
</tr>
<tr>
<td>Nose</td>
</tr>
<tr>
<td>Lip</td>
</tr>
<tr>
<td>Chin, and cheek</td>
</tr>
</tbody>
</table>
in 14 patients, and the left side was involved in 12 patients. Middle third and lower third defects were present in 7 (27%) cases each. About 6 patients (23%) presented with the upper third defects and 4 (15%) patients presented with upper 2/3rd defects. Two patients presented with the lower 2/3rd defects.

Primary reconstruction was done in about 15 (88%) cases in the trauma theatre. Secondary reconstruction was done in 2 (12%) cases in elective operation theatre (Table 5).

Superiorly based postauricular (PA) skin flap with cartilage implantation was done in 12% (N = 2) of the cases with the upper third defects. Superiorty based PA flap was done in 6% (N = 1) of the cases in the upper third defect and inferiorly based PA flap was done in 6% (N = 1) of the cases with the lower and middle third defect. Converse tunnel procedure was done in 12% (N = 2) of the cases for the middle third defect. PA bipedicled flap was done in 6% (n=1) of the cases for middle third defect. Skin graft was done in 12% (N = 2) of the cases for partial thickness loss in the upper and middle third defects. For lobule reconstruction, double cross skin flap was done in 22% (N = 4) of the cases followed by “Y” flap in 6% (N = 1) of the cases. Reimplantation of the injured, debrided ear was attempted in 6% (N = 1) of the cases as a composite graft (Table 6).

Flap edema occurred in 4 (58 %) cases. There was no wound infection in any of the cases. Skin graft took well in both the cases. There was partial flap necrosis in “Y” flap reconstruction done for lobule defect. Hypertrophic scar was present in one case with double cross skin flap done for lobule defect (Table 7).

In about 86% (N = 6) of the cases, the lower lip was injured particularly in the middle third. In only one case (14%), the upper lip was injured. There was partial thickness loss in six cases (86%). Only one patient (14%) presented with full thickness loss of the lower lip involving the middle part (2/3rd defect). In 6 (86%) patients the loss was <1/3rd. In only one patient (14%), the loss was about 2/3rd of the lower lip. None of the cases had more than 2/3rd loss.

In about 6 (86%) patients primary reconstruction was done in the trauma theatre under local anesthesia. In only 1 (14%) patient secondary reconstruction was done using bilateral stair step advancement flap for 2/3rd defect of the middle of the lower lip in elective theatre under endonasal general anesthesia (Table 8).

In about 5 (72%) patients, wedge excision of the defect was done, and primary suturing was done in three layers using 3/0 Vicryl for mucosa and muscle followed by 4/0 ethilon simple suture for the skin under local anesthesia. In one patient, there was partial thickness loss involving only the vermilion in the middle third of the lower lip, mucosal advancement flap reconstruction was done. In another patient with about 2/3rd loss of middle part of the lower lip, stair step opposing advancement flap reconstruction was done (Table 9).

Wound gaping was present in one case, which was sutured by wedge excision and suturing. It was resutured on the second post-operative day. The wound was healthy on further follow-up. Microstomia was present in one patient who underwent Stair-step Opposing Advancement Flap

<table>
<thead>
<tr>
<th>Table 5: Timing of reconstruction – Ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction</td>
</tr>
<tr>
<td>Primary</td>
</tr>
<tr>
<td>Secondary</td>
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</table>

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<tr>
<th>Table 6: Methods of reconstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures</td>
</tr>
<tr>
<td>PA flap with cartilage implantation</td>
</tr>
<tr>
<td>PA flap</td>
</tr>
<tr>
<td>Converse tunnel procedure</td>
</tr>
<tr>
<td>Dieffenbach procedure</td>
</tr>
<tr>
<td>Postauricular bipedicled flap</td>
</tr>
<tr>
<td>Skin graft</td>
</tr>
<tr>
<td>Double cross skin flap</td>
</tr>
<tr>
<td>“Y” flap</td>
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<td>Reimplantation</td>
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<tr>
<td>Flap edema</td>
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<tr>
<td>Reimplanted part necrosis</td>
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<tr>
<td>Wound infection</td>
</tr>
<tr>
<td>Graft loss</td>
</tr>
<tr>
<td>Partial flap loss</td>
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<tr>
<td>Hypertrophic scar</td>
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<thead>
<tr>
<th>Table 8: Timing of reconstruction – Lip</th>
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</thead>
<tbody>
<tr>
<td>Reconstruction</td>
</tr>
<tr>
<td>Primary</td>
</tr>
<tr>
<td>Secondary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 9: Methods of reconstruction – Lip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
</tr>
<tr>
<td>Mucosal advancement flap</td>
</tr>
<tr>
<td>Stair step opposing advancement flap</td>
</tr>
<tr>
<td>Wedge excision and suturing</td>
</tr>
</tbody>
</table>
reconstruction which resolved after 3 months. There was no wound infection in any of the cases (Table 10).

Nose
All the patients who had bites on the nose were males in the economically productive age group. All of them belonged to backward community and lived in and around Madurai. They had completed their middle school education. Majority of the victims and assailants were under the influence of alcohol. Family quarrels and unknown reasons were responsible for the injuries. In all the cases, the lower third of the nose was affected. These patients presented to the emergency ward late in the afternoon.

Reconstruction
In all the four cases secondary reconstruction was done using oblique forehead flap in stages, in elective operation theatre under general anesthesia. In the first stage, defect was recreated, oblique forehead flap was planned, raised and attachment given to the defect. In the second stage after 3 weeks, once the scar settled well, pedicle was divided, and flap inset was given using 4/0 ethilon. The pedicle was returned to reconstruct the glabellar region. The remaining part of the pedicle was discarded. There was no wound infection or flap failure. The average hospital stay was 5 days.

DISCUSSION
The human bite injury is a deceptive wound. The potential for infective, functional and esthetic complications requires prompt treatment in an appropriate setting. Human bite injuries may present in one of two forms, the closed fist injury or the occlusive bite injury. Primary reconstruction of the facial defects improved the self-esteem of the patients, reduced the hospital stay as well as the cost and had a regular follow-up. Most of the patients belonged to the economically productive age group of 21-40 years. In a study conducted by Harrison, majority of those bitten were young males, with 44% of the males aged 16-25 years. The male to female ratio was 3:1. About 74% of the assailants were under the influence of alcohol while committing the injury. Ear was the common site of injury followed by lip and nose. In a study conducted by Henry et al. alcohol consumption was documented in 86% of cases. The majority (70%) occurred over the weekend or on a public holiday. Facial injuries made up 70% of injuries with the remainder being to the upper limb. Middle third and lower third defects were the common presentations. Ear reconstruction remains one of the most challenging procedures encountered by reconstructive surgeons. This is due to the intricate detail and anatomic complexity of the cartilaginous auricular framework and its relationship with its thin soft-tissue envelope. The golden standard is a reconstruction with autologous costal cartilage introduced by Tanzer. This is later expounded by Brent and refined by the work of Nagata and Firmin. This study focused on autologous ear reconstruction after trauma. Bite injuries were the leading cause of acquired auricular deformities. Totally, there were seven patients who had lip defects. Only one of them had upper lip defect which was partial and included the right lateral subunit. Out of them, five patients had <30% tissue loss. In all the cases, the tissue defect always included the Vermillion. As a complex reconstructive procedure price to establishment of adequate margins can certainly compromise the ultimate result, it is appropriate not to perform closure until margins have been adequately examined. Functional reconstructions are best accomplished with innervated myocutaneous flaps of orbicularis oris for either lips or the depressor anguli oris lower lip or the innervated levator anguli oris flap for the upper lip. In these five patients, primary reconstruction was done with wedge excision of the defect and closure in three layers (Louis method).

CONCLUSION
Human bite wounds are notoriously deceptive and are often underestimated and undertreated. While controversies regarding optimal management continue, the basic tenets of meticulous wound care are no different than those for contaminated wounds. In ear reconstruction, timely coverage of cartilage framework using local flaps prevented perichondritis and deformities. For upper third defects superiorly based PA flap was ideal. For middle third defects converse tunnel, dieffenbach, and bipedicle flaps were done either with or without cartilage graft. Double cross skin flap gave good esthetic results in lobule reconstruction. In lip reconstruction, primary reconstruction using Louis method served the purpose. Proper wound debridement, antibiotic coverage, primary closure or reconstruction of human bites of the face gives a good result.

Table 10: Complications – Lip

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound gaping</td>
<td>1</td>
</tr>
<tr>
<td>Microstomia</td>
<td>1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>Nil</td>
</tr>
</tbody>
</table>

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Kumar, et al.: Human Bite Injuries


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Radiological Assessment of Alignment of Knee and Prosthesis after Primary Total Knee Arthroplasty

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Abstract

Background: Total knee arthroplasty (TKA) is procedure which is widely performed to give functional improvement and pain relief in advanced knee arthritis patients. Nonanatomic component placement often results in component loosening. Hence, correct sizing and placement are important for optimal functional and long-term results.

Objectives: The aim of this study is to evaluate alignment of knees and placement of prostheses in post-operative knee roentgenograms.

Materials and Methods: This is retrospective study of patients who underwent TKA using various types of prostheses in a tertiary care institute. Various angles were measured to evaluate limb alignment, placement of the tibial and femoral prostheses according to roentgenographic knee evaluation system endorsed by the knee society¹ and also roentgenographic index was calculated as suggested by Lotke et al.²

Results: We evaluated 100 post-operative knee roentgenograms in a tertiary care institute. Out of which, 88 knees showed acceptable, overall knee alignment calculated by tibiofemoral angle. A total of 82 knees showed normal placement of femoral component calculated by femoral component alignment angle. A total of 85 knees had tibial component placement within normal range calculated by tibial component alignment angle. Totally, 90 knees showed roentgenographic index score in normal range.

Conclusion: In this study, we conclude that total knee arthroplasties were done without using navigation and with proper technique also give fairly good amount of radiological alignment and placement of prostheses.

Key words: Alignment, Prostheses, Roentgenographic index, Total knee arthroplasty

INTRODUCTION

Total knee arthroplasty (TKA) is widely performed procedure that has been demonstrated to provide functional improvement and pain relief for most of patients with advanced knee arthritis.¹ Successfulness of this procedure depends on many factors including pre-operative condition of patient, the design and materials of components, and surgical technique.² Nonanatomic component placement or ligamentous instability often results in components loosening. Tibial component more frequently loosens than others. Various surgical techniques and systems of instrumentation have been devised to obtain optimal post-operative alignment of components. The importance of correct sizing of components and putting them in correct axial alignment and angular positioning for TKA for optimal functional and long-term result has been stressed. Radiologic evaluation is done to assess the alignment and early diagnosis of loosening, instability, polyethylene wear, patellar complications, infection, etc. The present study focuses on the radiological evaluation post-operatively by a roentgenographic knee evaluation system endorsed by the knee society³ which encourages uniform reporting of the results of TKA. In addition to measurement of
knee alignment and component position, the system has a numerical score for the prosthetic interface that assesses the quality of fixation.

**Aims and Objectives**
The aim of this study is to evaluate alignment of knees and placement of prostheses in post-operative roentgenograms.

**MATERIALS AND METHODS**

This is a retrospective study of patients who underwent TKA using various types of prostheses in a tertiary care institute from 2010 to 2016. A total of 100 knees in 62 females and 38 males were included in this study for evaluation. Patients with primary knee osteoarthritis, secondary osteoarthritis with pain, and requiring TKA were included, whereas grossly deformed knees requiring stem extenders and revision TKA were excluded from this study. Informed consent was obtained from each patient. Both anteroposterior and lateral plain radiographs are taken in standing position in post-operative status. All measurements were carried out by trained investigator and radiological parameters were studied. The position of a prosthesis was evaluated by reviewing the initial post-operative roentgenogram and grading it on a previously developed scoring system suggested by Lotke et al.\(^4\) (Table 1).

Mean values of the angle between the individual axes obtained by taking measurements were used in following statistical analysis.

Roentgenographic index\(^4\) of our patients was calculated and grouped into five groups. The Pearson’s correlation coefficient (p) was calculated to measure the significance of the correlation. Statistical significance for all tests was set at \(P < 0.05\).

**RESULTS**

We studied 100 knees out of which 62 were female and 38 were male. We analyzed overall limb alignment with tibiofemoral angle (δ) (angle between tibial anatomical axis and femoral anatomical axis). A total of 68 knees had normal alignment (Table 2) and 88 knees had alignment from 3° varus to 10° valgus. For the femoral component alignment, there were 82 knees which were having placements within 3° varus/valgus of normal placement and 18 knees which having prosthesis with >3° varus/valgus placement (Table 3). For the tibial component alignment, there were 85 knees with tibial components placement within 3° varus/valgus of normal placement, and 15 knees had prosthesis with >3° varus/valgus placements (Table 4). On lateral view, the average femoral flexion angle was 6.32 ± 6.80° and average tibial flexion angle (σ) was 91.56 ± 3.80°.

We evaluated postoperative placement of prosthesis radiologically with roentgenographic index as suggested by Lotke et al.\(^4\) Mean roentgenographic index was 85.2 ± 9.32. Range was 50 to 100. Around 9 knees had roentgenographic index of 100, i.e., had perfect placement of prosthesis.

### Table 1: Calculation of roentgenographic index

<table>
<thead>
<tr>
<th>Overall alignment (possible 25 points)</th>
<th>Valgus</th>
<th>Varus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral ± 2°</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>3-7°</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>8-12°</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>13-20°</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Tibiofemoral angle

<table>
<thead>
<tr>
<th>Tibiofemoral angle (δ)</th>
<th>Number of knees</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3° varus</td>
<td>3</td>
</tr>
<tr>
<td>3° valgus to 3° varus</td>
<td>20</td>
</tr>
<tr>
<td>4° varus to 10° varus</td>
<td>68</td>
</tr>
<tr>
<td>11° varus to 17° varus</td>
<td>9</td>
</tr>
<tr>
<td>&gt;17° varus</td>
<td>0</td>
</tr>
</tbody>
</table>
A total of 36 knees had index between 90 and 100 while 90 knees had roentgenographic index of >75 (Table 5).

**DISCUSSION**

Total knee replacement has become a very successful procedure due to improvements in prostheses and surgical techniques. However, malpositioning of components is likely to occur which has got long-term consequences.

Restoration of limb axial alignment affects long-term results of TKA. Many authors have investigated the effect of coronal alignment on implant survival and have suggested tolerable limits of component placement within 3° varus/valgus of ideal placement based on analysis of highest success rates.

In previous studies, Jakobi *et al.* studied 1133 inner TKAs with post-operative radiographs for alignment. The average tibiofemoral angle (β) was 5° valgus. On anteroposterior radiographs, femoral alignment (α) was 95°. Mean tibial alignment angle was (β) 93°. Lateral radiographs revealed femoral component flexion of 88°, i.e., γ angle of 2°. Average tibial component flexion angle (σ) measured was 86°.

The radiological follow-up of index TKA with minimum 2 years showed no complete radiolucent lines, and none of the component was radiographically loose as well.

<table>
<thead>
<tr>
<th>Table 3: Femoral component alignment angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femoral component alignment angle (α)</td>
</tr>
<tr>
<td>&lt;0° varus</td>
</tr>
<tr>
<td>0°-3° valgus</td>
</tr>
<tr>
<td>4°-6° valgus (normal)</td>
</tr>
<tr>
<td>7°-9° valgus</td>
</tr>
<tr>
<td>&gt;9° valgus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Tibial component alignment angle (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibial component alignment angle (β)</td>
</tr>
<tr>
<td>&lt;87°</td>
</tr>
<tr>
<td>87°-89°</td>
</tr>
<tr>
<td>90° (Normal)</td>
</tr>
<tr>
<td>91°-93°</td>
</tr>
<tr>
<td>&gt;93°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Roentgenographic index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roentgenographic index</td>
</tr>
<tr>
<td>50-60</td>
</tr>
<tr>
<td>61-70</td>
</tr>
<tr>
<td>71-80</td>
</tr>
<tr>
<td>81-90</td>
</tr>
<tr>
<td>91-100</td>
</tr>
</tbody>
</table>

Mizu-uchi *et al.* studied total 76 total knee arthroplasties, out of which 39 were done with conventional method and 37 were done with CT-based navigation system. Mean tibial femoral angle was 4.2° valgus. Mean femoral component alignment angle was 88.5°. Mean tibial component alignment angle was 89.7°. Mean femoral component flexion was 85.5°.

As per Lotke *et al.*, normal tibiofemoral alignment is 4-10° valgus and normal femoral component (α) and tibial component (β) alignment angles are 4-6° valgus and 90° (perfect placement), respectively. As per Mizu-uchi *et al.*, normal femoral component flexion angle (γ) is 0-7° and tibial component flexion angle (σ) is 90°.

In the present study, we studied 100 knees and their radiological analysis pre- and post-operatively in a tertiary care center in India. In 65 knees, normal tibiofemoral angle of 4-10° valgus has been achieved. However, in 87 knees, the alignment was within 3° varus/valgus of normal alignment. Mean alignment was 5° valgus ±5.10. This falls well within recommended range of alignment as described in literature.

We had 35 knees having normal femoral component placement of 4-6° valgus and 82 knees had alignment within 3° varus/valgus of normal alignment. Mean femoral alignment angle (α) was 94° ± 3.92. These findings are in agreement with current literature as well.

We had 52 knees with tibial alignment angle (β) 90° (normal) and 85 knees with alignment within 3° varus/valgus of normal alignment. Mean tibial alignment angle was 91° ± 2.45. These results are well within normal recommended range.

Thus, more than 80 percent TKA having overall alignment, femoral component placement, and tibial component placement in acceptable limits on lateral radiographs.

Mean femoral component flexion angle (γ) was 6.32° ± 6.80, i.e., femoral component flexion was 83.68°. Mean tibial component flexion angle (σ) was 91.5° ± 3.80. Thus, results of our study are comparable with literature above.

There were no radiolucent lines in post-operative radiographs after minimum 1 year follow-up. It suggests proper placement and fixation of prosthesis in a short-term follow-up.

Lotke *et al.* in 1977 studied 76 TKAs done with geometric TKA. They evaluated position of prosthesis by reviewing initial post-operative radiograph and grading it according to roentgenographic index. Scores on initial post-operative
roentgenograms averaged 78.2 points. Seven knees received perfect score of 100 points.

According to point score system for roentgenographic analysis by Lotke et al., we analyzed the positioning of prostheses in total knee replacements. A total of 9 knees had perfectly positioned prostheses. Mean roentgenographic index was 85.25. Totally, 90 knees had index >75 which is an acceptable limit.

Alignment obtained from conventional plain radiographs is of limited value because they might have poor reproducibility caused by tibial rotation in lateral view. In contrast, measurements based on computed tomography (CT) images are more accurate as variations in calculations are smaller.

**CONCLUSION**

In this study, we conclude that tibial and femoral component alignment as well as the overall limb alignment achieved is comparable to the normal knee anatomy using conventional method in most of the patients. However, more accurate study with CT scan would be beneficial to find out a rationale. Further randomized control trials are needed to compare results of TKA done by navigation system and mechanical alignment devices.

**REFERENCES**


**Source of Support:** Nil, **Conflict of Interest:** None declared.
Mammography Correlated with Histopathology in the Diagnosis of Mass Lesions of the Breast in a Tertiary Teaching Hospital: An Analytical Study

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Abstract

Introduction: Tumors of the breast are characterized by uncontrolled growth of cells in the mammary epithelial tissue. The most frequent type of tumor occurring in females is breast tumors worldwide. Mammography computer-aided digital technique has helped in the diagnosis of early benign and malignant lesions of breast since the beginning of the 21st century. However, false positives are a major concern in breast tumor screening. They are not evaluated as a prognostic factor for tumor detection.

Aim: To evaluate the association of false positive results of mammography confirmed with fine needle aspiration cytology (FNAC), histopathological (HPE) features and repeat mammography over a period of 4 years.

Study Design: This is a retrospective comparative analytical study.

Study Period: June 2012-May 2016 (4 years).

Materials and Methods: Results of 2196 patients who underwent mammography in a tertiary teaching hospital, Kerala were included in the study. Demographic details of the sample were obtained from the medical records of the patients. False positive, results were identified based on negative FNAC and HPE findings. Subsequent mammography results of patients of such false positive patients were done to find the incidence of tumor risk.

Results: The total number of women patients attending the daily OPDs of the hospital was 6,70,440 for 4 years. The prevalence of women reporting breast related complaints and undergoing mammography was 0.32%. There was a positive family history of malignant tumors of breast in 14 of the 54 patients (25.92%) confirmed with malignant tumors in this study. Among the 2196 mammography procedures, 1479 were reported as normal (67.34%). Benign lesions of the breast such as cysts, hematoma, localized abscesses, galactoceles, and fibroadenosis were reported in 389 women (17.71%). 274 women had shown benign tumors of breast reported following mammography (12.47%) such as fibroma, neurofibroma, fibroadenoma, and simple adenoma. The remaining 54 mammography results were showing features of a malignant tumor on mammography were subjected to dynamic contrast enhanced magnetic resonance imaging (DCEMRI), and diffusion-weighted images (DWI) of the breast.

Conclusion: Mammography screening proves to be an excellent tool in the diagnosis of diseases of the breast. There is a definite relation between the presence of a false positive test and the risk of cancer detection in subsequent screening participations. The association was much clear in false positives involving a cytology examination or biopsy, and in women with a family history of breast cancer.

Key words: Breast screening, Biopsy, False positive and risk factors, Fine needle aspiration cytology, Tumors of the breast

INTRODUCTION

After mammography was introduced as a screening tool in the diagnosis of tumors of the breast the mortality from cancer breast has dropped drastically since 1990. However, the limitation of mammography lies in patients with dense breasts where lesions identification is limited by surrounded
fibroglandular tissue and post-operative patients with excisions of tumors from breasts. Digital subtraction mammography and contrast enhanced mammography have an important role differentiating the benign from malignant tumors. Positive mammography patients are subjected to fine needle aspiration cytology (FNAC) and/or biopsy histopathological (HPE) for confirmation and necessary treatment is adopted. However, the false positive result becomes a major concern wherein the FNAC and HPE turn out to be negative. It leads to psychological and behavioral consequences in the false positive mammography women. It leads to further repeat biopsies or excision biopsies. The incidence of false positive results in Europe is 20 to 30% and in USA 49%, 8-10 Benign breast lesions are a known risk factor for subsequent breast cancer11,12 and women with benign breast surgery have lower sensitivity at screening.13 There are no many studies which report the association between false positive results and detection of breast cancer in subsequent screenings. In this context, this study is conducted to evaluate the association of false positive results of mammography confirmed with FNAC, HPE features and repeats mammography over a period of 4 years.

MATERIALS AND METHODS

Results of 2196 patients who underwent mammography in a tertiary teaching hospital, Kerala were included in the study. Demographic details of the sample were obtained from the medical records of the patients. Women showing positive radiological signs of mammography for malignant tumors were further subjected to dynamic contrast enhanced magnetic resonance imaging (DCEMRI), and diffusion-weighted images (DWI) of the breast. False positive results were identified based on negative fine needle aspiration (FNAC) and HPE findings. Repeat mammography and repeat FNAC and/or excision biopsy was done in the patients to find the incidence of tumor risk. Institutional Ethical Clearance was obtained, and consent was not necessary because the study was a retrospective one.

Inclusion Criteria

(1) Women aged above 45 years and below 70 years were included, women with complaints of lump in the breast, discharge from the nipples and tenderness in the breast were included, patients with positive mammography signs and negative FNAC and/or HPE were included.

Exclusion Criteria

(1) Women aged below 45 and above 70 years were excluded, women with positive mammography and positive FNAC and/or HPE were excluded. Demographic details of the sample were obtained from the medical records of the patients. Repeat mammography results of patients of such false positive patients were done to find the incidence of tumor risk. If the tumor was excluded after additional evaluation, women were routinely invited to participate in the screening program for 2 years regular follow-up. All the data were analyzed using standard statistical methods.

RESULTS

Results of 2196 patients who underwent mammography in a tertiary teaching hospital, Kerala were included in the study over a period of 4 years. The total number of women patients attending the daily outpatient departments of the hospital was 6, 70, 440 for 4 years. The prevalence of women reporting breast related complaints and undergoing mammography was 0.32%. There was a positive family history of malignant tumors of breast in 14 of the 54 patients (25.92%) confirmed with malignant tumors in this study. Among the 2196 mammography procedures, 1479 were reported as normal (67.34%). Benign lesions of the breast such as cysts, hematoa, localized abscesses, lactocele, and fibroadenosis were reported in 389 women (17.71%). 274 women had shown benign tumors of breast reported following mammography (12.47%) such as fibroma, neurofibroma, fibroadenoma, and simple adenoma. The remaining 54 mammography results were showing features of malignant tumor on mammography were subjected to dynamic contrast enhanced MRI (DCEMRI), and DWI of the breast. 48 of the 54 patients with MRI diagnosis of malignant tumors were confirmed by FNAC, and the remaining 6 were proved negative for FNAC and HPE. These patients were termed as false positive cases and advised regular follow-up for 2 years. During this period 3 of them were subjected to FNAC at 3 monthly intervals. They were negative for malignant cells on FNAC on all three attempts. Hence, 2 patients were subjected to excision biopsy and HPE. Both the cases were proved negative for malignancy reported by two independent pathologists. One patient was lost for further follow-up. The remaining 3 patients underwent excision biopsy, and the tumor mass was negative for HPE. 2136/2196 patients were premenopausal (61.9%) and 1960 were postmenopausal (93.80%) (Table 1).

Women belonging to low socioeconomic group were 1065 (48.49%), middle socioeconomic group was 691 (31.46%), and upper socioeconomic group was 470 (21.40%), (Table 2).

The benign conditions of the breast reported on mammography were 397 (17.71%), and their break up is shown in Table 3.
The benign tumors of the breast reported on mammography were 274 (12.47%), and their break up is shown in Table 4.

Among the 54 patients with positive mammography 48 patients showed positive to malignancy both by FNAC and HPE. The false positive cases were 6 in number (Table 5).

### DISCUSSION

According to International Agency for Research on Cancer (IARC), the global cancer burden has increased and is now second leading cause of death due to cancer worldwide. Early diagnosis with improved diagnostic tools required to differentiate benign from malignant lesions to reduce the mortality and morbidity and also avoid painful biopsy. This would help those women who do not have distant metastases; hence their long-term survival period is prolonged after the diagnosis. In addition, there are dilemmas between findings of ultrasound and mammography signs and techniques. In mammograms, fat is radiolucent and appears dark, but fibro-glandular tissues are radiodense and appear white. Few studies have shown that a tumor becomes detectable on a mammogram only after 40 cell doublings from the growth of the first tumor cell in breast cancer. Thus, a possibility of false positive or false negative reporting is present requiring more efficient correlation mechanism better prediction of malignant tumors. The prevalence of women reporting...
breast related complaints and undergoing mammography was 0.32% in this study of 2196 cases. It amounts to 3.2 cases/1000 screening mammograms. This finding is similar a study by X. Castells et al.21 It was observed women with a false positive involving cytology or biopsy had a higher risk of cancer detection than those with a false positive involving only an additional imaging procedure. This risk remained significantly higher 4 years or more after the false positive test. Similarly, the cancer detection risk increases substantially if the women had a first-degree familial history of breast cancer. The increased cancer detection risk in women with a false positive test observed in this study is in agreement with the results of X. Castells et al.21 Similar opinions were quoted in studies by Euler-Chelpin et al.15 and McCann et al.22 However, some authors reported false negative mammography tests in women undergoing additional evaluation after a positive mammographic test.23,24 Absence of malignancy in a false positive mammography does not rule out existence of a benign breast lesion.25 Hence, few authors have kept in mind the impact of the previous benign lesions while undertaking mammography for breast cancer. In this study, the false positives involving a cytology examination or biopsy had an increased cancer detection risk compared with additional imaging procedures. In patients with increased breast density are associated with more number of false positive mammography reports as well as increased breast cancer risk.26 Women with a false positive result should be encouraged to return for further screening as they have an increased cancer detection risk, and a decreased re-attendance probability.27 Berg et al., have reported a sensitivity, specificity, and accuracy of 83%, 34%, and 67.8% for ultrasound investigations. In the same study, they have reported sensitivity, specificity, and accuracy of 67.8%, 75%, and 70.2% for mammography investigations. The combined ultrasound, mammography, and clinical examination have yielded sensitivity and accuracy of 93% and 70.9%.28 In this study, the sensitivity, specificity, and accuracy related to benign conditions and tumors were 100%. Similarly, the sensitivity, specificity, and accuracy for malignant tumors were 88.88%.

CONCLUSIONS

Mammography screening proves to be an excellent tool in the diagnosis of diseases of the breast. There is a definite relation between the presence of a false positive test and the risk of cancer detection in subsequent screening participations. The association was much clear in false positives involving a cytology examination or biopsy, and in women with a family history of breast cancer.

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Study of Clinical and Hematological Profile of *Plasmodium vivax* Malaria in a Tertiary Care Hospital in Western Maharashtra

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Department of General Medicine, Krishna Institute of Medical Sciences, Karad, Maharashtra, India

**Abstract**

**Background:** Malaria continues to be one of the important public health problems in India. As per the World Health Organization (WHO) report 2015, Southeast Asian region bears the second largest burden of malaria (10%), only being next to African region (88%). The present study is aimed at to study clinical and hematological profile of patient with *Plasmodium vivax* malarial infection.

**Materials and Methods:** Cases satisfying WHO criteria of malaria included in the study population which included 100 patients admitted in Krishna Institutes of Medical Sciences.

**Results:** A maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years and 67% male and 33% were female. Fever was the most common clinical manifestation present in 100% cases followed by nausea and vomiting in 42%, headache in 23%, myalgia in 19%, pain abdomen in 13%, joint pain in 12% cases, cough 8%, and dyspnea in 4%.

**Conclusion:** Thrombocytopenia is a common complication seen in vivax malaria and is no longer a distinguishing feature between vivax and falciparum. The clinicians should be aware of this change and give as much attention to vivax malaria so that they can identify the early signs of complications and severe disease. This will help in reducing the morbidity and mortality in malaria.

**Key words:** Clinical, Hematology, Malaria *Plasmodium vivax*, Western Maharashtra

**INTRODUCTION**

Malaria continues to be one of the important public health problems in India. As per the World Health Organization (WHO) report 2015, Southeast Asian (SEA) region bears the second largest burden of malaria (10%), only being next to African region (88%). Malaria caused 214 million infections and 438000 deaths worldwide, most of them occurred in the Africa region (90%) followed by SEA region (7%). Among SEA region, India shares two-third of the burden (66%) followed by Myanmar (18%) and Indonesia (10%). The malaria situation remains a major problem in certain states and geographical pockets. The majority of malaria cases and deaths in India are being reported from Orissa, Rajasthan, Jharkhand, Chhattisgarh, Madhya Pradesh, and the Seven Northeastern states.

Malaria is caused by protozoan parasite of genus plasmodium. Five species of the plasmodium such as *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium Malariae*, and *Plasmodium knowlesi* cause malaria in humans. Infection is initiated when sporozoites from the salivary glands of a female anopheles mosquito are inoculated during a blood meal into the human blood stream. The common clinical manifestation is fever with chills and rigors, headache, vomiting, jaundice and common sign being splenomegaly, pallor, and icterus. Hematological abnormality which is most commonly seen in malaria is thrombocytopenia followed by anemia.
MATERIALS AND METHODS

Source of Data
A detailed history and physical examination details were collected from patient records in the hospital medical record department. Laboratory investigations were also obtained from the records.

Method of Collection of Data
Cases satisfying WHO criteria of malaria included in the study population which included 100 patients admitted in Krishna Institutes of Medical Sciences. The patient record was analyzed, name, age, sex, duration of symptoms, test done for confirmation, forms of malaria, treatment received from outside, presenting complaints, clinical signs, laboratory investigations, comorbid conditions, and treatment given, and outcome of the treatment was recorded. Patients’ population included from urban, rural, and peripheral areas.

Design of the Study
This was a retrospective cross-sectional descriptive study.

Duration of the Study
The study was carried out on patients presenting with malaria during a 24-month period from January 1, 2015 to December 31, 2016.

Inclusion Criteria
All the cases were tested positive for malaria parasite and admitted at the medicine ward in the age group of 15 year and above were included in this study.

Exclusion Criteria
Patients presenting with fever (malaria smear negative) but treated empirically for malaria were excluded from the study, and patients presenting with clinical features mimicking malaria (malaria parasite test negative) as in leptospirosis, dengue fever and sepsis had been excluded from the study.

RESULTS
Figures 1-3 and Tables 1-7.

DISCUSSION
In the present study, a total of 100 malaria cases were studied, a maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years. Similar study was done by Estacio et al. who reported that most of their patients (30%) were in between 19 and 35 years of age and Sudhirbabu et al. reported that 30% of cases were in the age group of 21-30 years of age, Maddhu et al. reported that 70% of cases were in the age group of 21-30 years of age, and Suryawanshi et al. also reported that maximum number of cases (64%) were in between the age group of 20-40 years with the high incidence (34.71%) between...
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The age group of 20-30 years in their study. In the present study and other similar study, there were mostly young- and middle-aged group patients who were affected.6,9 This may be due to young- and middle-aged group which are being more active outdoors from dawn to dusk.

A total of 100 patients were hospitalized, out of which 67% were male and 33% were female. Male-to-female ratio was 2.03:1. Our study shows male preponderance, this is consistent with similar study conducted by Wasnik et al.10 and also finding concordance to study conducted by Deshwal11 with male preponderance of 79%, this finding is in consistent to study by Bhakshi12 where female outnumbered male. This could be because of geographical location and also possibility of incidence of malaria more in men than in women due to working pattern, i.e., man exposed to mosquito’s bites outdoor.

In the present study, fever was the most common clinical manifestation which presents in 100% of cases followed by nausea vomiting in 42%, headache in 23%, myalgia in 19%, pain abdomen in 13%, joint pain in 12% of cases, cough 8%, and dyspnea in 4%. The present study’s results are nearly similar to study done by Gopinathan et al. who reported fever in 97.8%, vomiting in 42.2%, and headache in 69%. Murthy et al. who also reported fever with chills and rigor in 98.1%, later Madhu et al. noticed that fever was present in all cases (100%), nausea and vomiting in 37.36%, headache in 33.6%, jaundice in 15.78%, and altered level of consciousness in 4.21% cases, and even Devineni et al. also noted that fever was the most common symptom (100%) followed by vomiting in 22.22% and headache in 25.56%.6,7,13,14 Hence, according to above-mentioned studies and the present study, the most common symptoms were fever, headache, and vomiting.

In the present study, 7% of the patients had HB levels <5 g%, 28% had levels between 5 and 10 g%, and 65% had levels >10 g%. Naik conducted a prospective study to look for the incidence of jaundice in P. vivax malaria patients in Moodabidri in South India. The mean hemoglobin level was 12.8 g/dl. Nearly 15.8% of the patients were anemic.15 Ameetkumari et al. conducted a cross-sectional study in central hospital laboratory of a tertiary care hospital of Surat, Gujarat. They found that mean hemoglobin level was 10.26 g/dl in P. vivax malaria patients.16 Charulata et al. conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. Severe anemia (HB <5 g/dl) was found 2.96% of the P. vivax malaria patients.17

In the present study, total leukocyte count in study participants. Nearly, 23% of the patients had total leukocyte count <4000/cmm (leucopenia), 69% had 4000-11000/cmm, and 8% had counts >11000/cmm (leukocytosis). Myoung et al. conducted a study on clinical features of

Table 2: Sex-wise distribution of the study participants

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>67 (67)</td>
</tr>
<tr>
<td>Female</td>
<td>33 (33)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100)</td>
</tr>
</tbody>
</table>

Table 3: Clinical profile of the study participants

<table>
<thead>
<tr>
<th>Symptoms and signs</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>100 (100)</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>42 (42)</td>
</tr>
<tr>
<td>Headache</td>
<td>23 (23)</td>
</tr>
<tr>
<td>Cough</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>19 (19)</td>
</tr>
<tr>
<td>Joint pain</td>
<td>12 (12)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>13 (13)</td>
</tr>
<tr>
<td>Pallor</td>
<td>32 (32)</td>
</tr>
<tr>
<td>Petechiae</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>16 (16)</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>22 (22)</td>
</tr>
<tr>
<td>Hepatosplenomegaly</td>
<td>8 (8)</td>
</tr>
</tbody>
</table>

Table 4: Hemoglobin levels among study participants

<table>
<thead>
<tr>
<th>Hemoglobin (g%)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>7 (7)</td>
</tr>
<tr>
<td>5-10</td>
<td>28 (28)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>65 (65)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100)</td>
</tr>
</tbody>
</table>

Table 5: Total leukocyte count among study participants

<table>
<thead>
<tr>
<th>Total leukocyte count</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4,000</td>
<td>23 (23)</td>
</tr>
<tr>
<td>4,000-11,000</td>
<td>69 (69)</td>
</tr>
<tr>
<td>&gt;11,000</td>
<td>8 (8)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100)</td>
</tr>
</tbody>
</table>

Table 6: Platelet count among study participants

<table>
<thead>
<tr>
<th>Platelet count</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50,000</td>
<td>7 (7)</td>
</tr>
<tr>
<td>50,000-1,50,000</td>
<td>62 (62)</td>
</tr>
<tr>
<td>&gt;1,50,000</td>
<td>31 (31)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100)</td>
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</tbody>
</table>

Table 7: Parasitic index among study participants

<table>
<thead>
<tr>
<th>Parasitic index (%)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>96 (98)</td>
</tr>
<tr>
<td>6-10</td>
<td>2 (2)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>00 (00)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (100)</td>
</tr>
</tbody>
</table>
vivax malaria in South Korea. In their study, 19.9% of the patients had leukopenia, 77.2% had normal levels, and 2.9% of patients had leukocytosis. Shamim et al. conducted a study regarding hematological changes in malaria in a tertiary care hospital in Maharashtra. They found that 7.40% of the P. vivax patients had leukocytosis while 11.11% of patients had leukopenia. Charulata et al. conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. They found that leukopenia was present in 19.53% of the cases.

In the present study, platelet count among study participants was <50000/cmm in 7% of the patients, 50000-150000/cmm in 62% of the patients, and 150000/cmm in 31% of the patients. Ameetkumari et al. conducted a cross-sectional study in central hospital laboratory of a tertiary care hospital of Surat, Gujarat. Mean platelet count was 99487/cmm. They also found that as the severity of increases, the platelet count decreases. Charulata et al. conducted a study of complications of vivax malaria in comparison with falciparum malaria in Mumbai. Platelet count of <100000/cmm was present in 68% of the P. vivax patients. Shamim et al. conducted a study regarding hematological changes in malaria in a tertiary care hospital in Maharashtra. They found that thrombocytopenia was present in 59.25% of the P. vivax patients. Beg and Sani conducted study on comparative features and outcomes of malaria at a tertiary care hospital in Karachi, Pakistan. Mean platelet count was 91000/cmm.

In the present study, parasitic index among all the study participants. About 98% of the patients had parasitic index between 0-5% and rest had levels between 6 and 10%. Parasitoids was estimated by counting the number of parasitized red blood cells (RBCs) among 1000 RBCs. Ararathi et al. conducted a study on clinical outcome in malaria - reiterating the role of parasitic index. In their study, they found that 81.48% of the P. vivax patients had parasitic index between 0 and 5%, 14.81% had index between 6 and 10%, and only 3.70% had index between 11 and 20%.

CONCLUSION

In this study, a maximum number of cases (78%) were in between the age group of 18-50 years with the high incidence (38%) between the age group of 18-30 years with 67% males and 33% were females. Fever is the presenting complaints in almost all the cases and severe anemia was present in 7% of the patients. Leukopenia and thrombocytopenia were present in 23% and 69% of the patients, respectively. Maximum patients had parasite index between 0 and 5. Thrombocytopenia is a common complication seen in vivax malaria and is no longer a distinguishing feature between vivax and falciparum. The clinicians should be aware of this change and give as much attention to vivax malaria so that they can identify the early signs of complications and severe disease. This will help in reducing the morbidity and mortality in malaria.

REFERENCES

Ilioinguinal and Iliohypogastric Nerve Block Following Inguinal Hernia Repair under Spinal Anesthesia: A Prospective Study of Assessment of Post-operative Pain and Discharge Time

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Abstract

Objective: The aim of this study was to evaluate post-operative pain analgesia with ilioinguinal (II) and iliohypogastric (IH) nerve block following repair of inguinal hernia surgery and time of discharge.

Materials and Methods: A total of 72 patients undergoing hernia repair surgery were divided into two groups of 36 each (A and B). Both the groups were operated under spinal anesthesia. Group A received II and IH nerve block with wound infiltration with 0.75% ropivacaine, and Group B did not receive any nerve block. Demographic data, pain intensity according to the visual analog scale (VAS), and number of doses of analgesics diclofenac sodium, ketorolac, and tramadol in the immediate postoperative period, as well as at the time of hospital discharge were recorded.

Results: The VAS at rest was significantly lower in Group A compared with Group B (P < 0.05), 3 h after the procedure, with no differences on VAS during movement in all post-operative periods. The number of doses of analgesics during the post-operative period was similar in both groups, but patients in Group A were discharged earlier than in Group B.

Conclusion: II and IH nerve block associated with surgical wound infiltration with 0.75% ropivacaine provides better post-operative analgesia and early hospital discharge in patients undergoing inguinal hernia repair under spinal anesthesia.

Key words: Analgesia, Anesthesia, Inguinal hernia, Local anesthesia, Peripheral nerves, Spinal

INTRODUCTION

Repair of inguinal hernia is one of the most common surgical procedures.¹-³ Immediate post-operative pain is an important issue that can delay ambulation and return of gastrointestinal motility, therefore, delaying hospital discharge.⁴ Besides, the presence of chronic pain after hernia repair surgery, which can affect up to 50% of patients, is a growing concern.⁵,⁶ This is related to inadequate post-operative pain management and becomes a fundamental duty of the surgeon to control post-operative pain. Despite several methods of analgesia, the management of post-operative pain is oftentimes unsatisfactory. Opioids, non-steroidal anti-inflammatory drugs, and analgesics are routinely used to alleviate post-operative pain, but they are associated with several undesirable effects and do not seem to be completely effective on preventing and treating post-operative pain.⁷ Ilioinguinal (II) and iliohypogastric (IH) nerve block represents a very popular regional anesthetic technique in surgical procedures in the sensitive area of those two nerves.⁸ In fact, for inguinal surgery (e.g., inguinal hernia), II and IH nerve block is as effective as caudal block.⁹ The objective of the present study was to evaluate post-operative pain analgesia with II and IH nerve block following repair of inguinal hernia surgery and time of discharge.
MATERIALS AND METHODS

The present study was a prospective, randomized, double-blind study. The Institutional Ethical Committee clearance was obtained. A ethical committee cleared consent letter was used before making the patients to participate in the study. The study period was between July 2015 and February 2017. The institution was Kannur Medical College, Anjarakandy, Kannur, Kerala, India.

Inclusion Criteria

(1) Patients aged between 20 and 60 years were included.
(2) Patients with non-relapsing, direct and indirect inguinal hernia were included.
(3) Patients with surgical physical status American Society of Anesthesiology (ASA) I and II were included in the study.

Exclusion Criteria

(1) Patients aged below 20 and above 60 years were excluded.
(2) Patients with lignocaine sensitivity were excluded.
(3) Patients with a history of chronic pain, daily use of central nervous system medications, body mass index (BMI) above 46 kg/m², and those with contraindications to the proposed anesthetic technique were excluded from the study. During the procedure, electrocardiography monitoring, precordial stethoscope, pulse oxymetry, and non-invasive blood pressure were monitored. All patients underwent spinal anesthesia with a 27G spinal needle (15 mg of hyperbaric 0.5% bupivacaine) on the sitting position and puncture of the L2-L3 or L3-L4 space. Occasional hypotension was treated with infusion of crystalloids, and if necessary, fractionated 5 mg doses of intravenous ephedrine until correction of the hypotension. All patients received intravenous sedation with increasing doses of midazolam to obtain satisfactory sedation. Before closure of the surgical wound, patients of Group A underwent II and IH nerve block and surgical wound infiltration. Group B did not undergo II and IH nerve block or surgical wound infiltration. II and IH nerve block was performed by administering 10 mL of 0.75% ropivacaine 2 cm above and 2 cm medial to the anterior superior iliac spine, according to Hadzig. After the end of surgery, patients were transferred to the post-anesthetic recovery unit. Pain intensity at rest and with movement (patient in the sitting position with legs hanging) was evaluated by the visual analog scale (VAS) (VAS: 0 - without pain; 10 - maximum pain) at 3, 6, and 12 post-operative hours and at the time of hospital discharge. Investigators evaluating post-operative parameters were unaware of the patient's group. A VAS > 4 at rest was considered for analgesic rescue with intravenous ketorolac (30 mg). In case, it was ineffective, intramuscular diclofenac (75 mg), and whenever necessary, intravenous tramadol (1 amp) were added. The number of analgesic doses, time interval until the 1st dose of analgesic, and length of hospitalization were recorded. Discharge criteria included complete motor recovery, ability to urinate, absence of nausea and vomiting, bleeding, and excessive pain. Sample calculation was based on the study of Toivonen et al., who detected a 0.9 difference on VAS with standard deviation of 1.5 among patients who underwent II and IH nerve block and those who received saline (control group). Data are presented as mean (minimum-maximum), median (minimum-maximum), and numbers. Student's t-test was used to compare age, duration of surgery, and BMI. Mann-Whitney test was used to compare VAS, time until the 1st dose of analgesic, use of analgesics, and length of hospitalization. Fisher's exact test was used to evaluate ASA. A value of $P < 0.05$ was considered statistically significant.

OBSERVATIONS AND RESULTS

Groups were homogenous regarding age, gender, ASA, BMI, and length of surgery (Table 1). The number of doses of ketorolac, diclofenac, and tramadol until hospital discharge was similar in both groups ($P > 0.05$). The mean time before the first dose ketorolac, diclofenac, and tramadol did not differ between Groups A and B (4.0 ± 2.1 and 6.2 ± 2.7 h, respectively). Anesthetic and surgical complications were not observed.

VAS at rest during different post-operative periods at 3 h, 6 h, and 12 h was assessed and found that they were significant statistically with $P$ values calculated (Table 2).

The time of discharge was calculated in hours following surgery as shown in Table 3 and found to be statistically significant with $P$ value 0.324 ($P$ significant at 0.05). The Chi-square statistic was 6.85 (Table 3).

DISCUSSION

It is a well accepted in the literature that the choice of anesthesia in inguinal hernia repair surgery is based on the preference of the surgeon, anesthesiologist, and patient. Field block and/or II and IH nerve block have better role in controlling pain in the post-operative periods following herniorrhaphy. In the present study, it was observed that pain, according to the VAS, was lower as to 3 h after surgery in Group A compared to Group B. However, differences in analgesic consumption and time until the 1st dose of analgesics were not observed. A prior study demonstrated that pre-incisional II and IH nerve block with 0.5% bupivacaine (15 mL) in herniorrhaphy under spinal anesthesia reduced pain scores up to 2 h after the surgery in relation to the group that underwent II and IH nerve block associated with general anesthesia. Earlier hospital discharge was observed (difference in the median...
of 5 h) in the group A patients who underwent II and IH nerve block than in the B group. In another study, it was demonstrated that patients who received local anesthesia had shorter hospital stay (3 h) than those who underwent spinal anesthesia or general anesthesia for inguinal herniorrhaphy. Currently, most inguinal herniorrhaphy operations are performed as day-care surgeries. Thus, the use of anesthetic techniques that allow adequate post-operative analgesia as well as earlier recovery and hospital discharge is necessary.

CONCLUSION

Post-operative II and IH nerve block following hernia repair surgery with 0.75% ropivacaine reduced pain up to 3 h after surgery and the length of hospitalization in patients undergoing inguinal herniorrhaphy under spinal anesthesia.

REFERENCES

Comparison of Outcomes between Video-assisted Thoracoscopic Surgery and Thoracotomy in Pediatric Patients for Empyema Thoracis

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Abstract

Introduction: A thoracotomy is a major surgical procedure that allows surgeons to access the lungs, heart, aorta, and diaphragm during surgery. The open surgical procedure, performed under general anesthesia, is performed to evaluate and treat pulmonary problems when non-invasive procedures are non-diagnostic or unlikely to be definitive. Recently, video-assisted thoracoscopic Surgery has been used to treat more patients with thoracic disorders.

Aim: The aim of this study is to analyze the usefulness of thoracoscopy in the pediatric population in the management of empyema thoracis in relation to its feasibility, safety, efficacy, and reliability.

Methods: This prospective study analyzing various procedures performed at the Department of Pediatric Surgery, Coimbatore Medical College Hospital and the outcome of the various procedures were evaluated. A total of 20 pediatric patients had undergone either diagnostic or therapeutic thoracoscopic procedures for empyema thoracis during the study.

Results: For thoracotomy cases, the Intercostal Drainage Tube (ICD) was kept in an average of 5 days, analgesia required in an average of 4.1 days, and children were ambulant in an average of 5.8 days. For thoracoscopic decortication cases, the ICD was kept in an average of 3.7 days, analgesia required in an average of 2.5 days, and children were ambulant in an average of 3.1 days. Among 8 cases of open decortication, 1 case needed a blood transfusion, and among 12 cases of thoracoscopy group, 1 case needed transfusion.

Conclusion: This study also reveals that thoracoscopic procedures can be done with conventional dual lung ventilation with pneumothorax. One-lung ventilation or double-lumen tubes are not mandatory. This study reveals that complications encountered in thoracoscopy are usually minor.

Key words: Empyema thoracis, Thoracotomy, Video-assisted thoracoscopic surgery

INTRODUCTION

Video-assisted thoroscopic Surgery (VATS) procedures are being used in children since 1970s. With the advent of smaller endoscopic instruments and improvement in video technology, more VATS procedures are being performed. These procedures are very safe and efficacious in pediatric patients of all age groups including newborn. Initially, the usefulness of thoracoscopy was limited to only biopsies, decortication, and deroofing of pulmonary cyst. Today, more than 20 types of VATS procedure are introduced in infants and children. They mainly deal with disease of the esophagus, lungs, mediastinal tumors, diseases of the diaphragm, pleura, and pericardium. VATS obviously has certain advantages such as superior cosmetic results, prevention of functional disorders of the thorax, lesser post-operative pain, and faster recovery. Endosurgery has a considerable learning curve. Future of the thoracoscopy in children depends on the creation of better and new instruments. With this background, the present study is...
intended to analyze various thoracoscopic procedures performed in our institution and examine the merits and demerits of this procedure.

**Aim**

The aim of this study is to analyze the usefulness of thoracoscopy in pediatric population in the management of empyema thoracis in relation to its feasibility, safety, efficacy, and reliability.

**MATERIALS AND METHODS**

This prospective study analyzing various procedures performed at the Department of Pediatric Surgery, Coimbatore Medical College Hospital and the outcome of the various procedures were evaluated. The Institutional Ethics Committee approval and informed consent from parents were obtained. A total of 20 pediatric patients had undergone either diagnostic or therapeutic thoracoscopic procedures for empyema thoracis during the study.

All patients who were investigated and confirmed of their diagnosis were taken up for therapeutic procedures. All patients received general anesthesia, controlled ventilation. Lateral decubitus position was used with the side of the pathology remaining upward. Dual lung ventilation used. Pneumothorax created with CO2 or atmospheric air. Number of ports varied according to the pathology and as per the need. No specialized instruments used. All patients received chest tubes following the procedure. Post-operative analgesia was given as per children's need.

**RESULTS**

The various observations made in this prospective study were recorded and analyzed. The following results were obtained from 20 pediatric patients. 12 male pediatric cases and 8 female pediatric cases underwent surgery.

Maximum number of cases was in 2-4 years group, followed by <2 years and <6 years age groups, respectively (Figure 1).

The etiological distribution of cases of empyema showed 19 cases were due to parapneumonic effusion and 1 case was due to tuberculosis.

Most of the patients with empyema thoracis sought medical help within 1 week of onset of symptoms. (Figure 2).

Table 1 shows the duration of illness and the type of procedure required to manage the patients. For patients presenting with less than a week of symptoms, feasibility of thoracoscopic procedure was higher. If the duration is more than 2 weeks, most of the patients needed thoracotomy for decortication (Table 1).

Table 2 shows the patients who needed thoracotomy for decortication as the procedure of choice which also shows most of the patients have come with duration of illness more than 2 weeks. Initial thoracoscopy revealed fibrothorax, which was later converted to thoracotomy (Table 2).

For thoracotomy cases, the Intercostal Drainage Tube (ICD) was kept in an average of 5 days, analgesia required in an average of 4.1 days, and children were ambulant in an average of 5.8 days.

Most of the patients who had come earlier for the management of pyothorax needed only thoracoscopic decortication. For thoracoscopic decortication cases, the

Table 1: Distribution of procedure done

<table>
<thead>
<tr>
<th>Duration of illness (weeks)</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thoracoscopy alone</td>
</tr>
<tr>
<td>&lt;1</td>
<td>9 (82)</td>
</tr>
<tr>
<td>1-2</td>
<td>2 (40)</td>
</tr>
<tr>
<td>&gt;2</td>
<td>1 (25)</td>
</tr>
</tbody>
</table>

VATS: Video-assisted thoracoscopic Surgery
ICD was kept in an average of 3.7 days, analgesia required in an average of 2.5 days, and children were ambulant in an average of 3.1 days. Among 8 cases of open decortication, 1 case needed blood transfusion, and among 12 cases of thoracoscopy group, 1 case needed transfusion (Table 3).

Table 4 shows the 4 pediatric patients who had complications in this study group, 1 case prolonged air leak, 1 case residual disease, and 2 cases in open thoracotomy group had wound infection. Even though there are two mortalities in this series which are unrelated to thoracoscopic procedures.

**DISCUSSION**

The various results and observations made from this study were compared with similar studies, and the outcome is discussed here. The feasibility and safety of VATS in children have been shown in several series. Conversion rate according to the series of studies discussed was 7% to 11%, conversion rate in the present study is 10% (Figure 3)\(^5\)\(^7\).

If the patients seek medical help earlier within 1 week, the condition was managed with thoracoscopic decortication. If the duration of symptoms was more than 1 week,

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\(^{5,7}\)
CONCLUSION

Thoracoscopy is definitely superior to thoracotomy in the management of empyema thoracis in relation to pain relief, morbidity, and early recovery. VATS has an important role in the management of empyema thoracis. Lower wound infection rate and better cosmetic results were also seen. This study also reveals that thoracoscopic procedures can be done with conventional dual lung ventilation with pneumothorax in children. This study reveals that complications encountered in thoracoscopy are usually minor.

REFERENCES


Table 5: Results of VATS in the treatment of pediatric empyema

<table>
<thead>
<tr>
<th>Reference</th>
<th>Patients (n)</th>
<th>Pre-operative chest tube (days)</th>
<th>Post-operative chest tube (days)</th>
<th>Post-operative LOS (days)</th>
<th>Total LOS (days)</th>
<th>Recurrence, failure, or death (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kern and Rodgers⁸</td>
<td>9</td>
<td>6.9±1.8</td>
<td>8.4±4</td>
<td>13.4±2.9</td>
<td>NA</td>
<td>1</td>
</tr>
<tr>
<td>Stovroff et al.⁹</td>
<td>12</td>
<td>4–6</td>
<td>4</td>
<td>6–8</td>
<td>NA</td>
<td>0</td>
</tr>
<tr>
<td>Silen and Weber⁰</td>
<td>3</td>
<td>4±1</td>
<td>7±1</td>
<td>8±1</td>
<td>NA</td>
<td>0</td>
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<tr>
<td>Davidoff et al.¹¹</td>
<td>9</td>
<td>NA</td>
<td>8.5</td>
<td>NA</td>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>Grewal et al.¹²</td>
<td>25</td>
<td>2±1.6</td>
<td>3.2±2.2</td>
<td>4.9±2.7</td>
<td>7.3±4</td>
<td>0</td>
</tr>
<tr>
<td>Present study</td>
<td>12</td>
<td>4–6</td>
<td>3.7</td>
<td>6–8</td>
<td>NA</td>
<td>1</td>
</tr>
</tbody>
</table>

LOS: Length of stay


Source of Support: Nil, Conflict of Interest: None declared.
Outcome of Pregnancy Complicated by Obstetric Cholestasis: A Prospective Study

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Abstract

Introduction: Obstetric cholestasis (OC), also known as intrahepatic cholestasis of pregnancy (ICP), is a hepatic disease unique to pregnancy which presents with intense generalized pruritus without any skin rash.¹ It is a temporary condition caused by maternal liver dysfunction during pregnancy and blood tests reveal increased levels of one or more of the liver enzymes.² The pathophysiology of intrahepatic cholestasis is poorly understood.³ A genetic background is suggested by family clustering and demographic variation, with the highest incidence reported from Chile-Bolivia (6%-27%) and Sweden (1-1.5%).² Prevalence in women of Indian Origin is 5%.² The prevalence may have seasonal cycles and may be more prevalent in winters.³ The importance of OC lies in the associated adverse pregnancy outcome. The potential risks are intrauterine fetal death (IUD), prematurity (usually iatrogenic), fetal distress, and postpartum hemorrhage (PPH).³,⁶⁻⁸ It is also associated with significant maternal morbidity due to persistent itching and consequent sleep deprivation.² Our study was aimed at determining the outcome of pregnancy of both mother and the fetus complicated by OC.

MATERIALS AND METHODS

A prospective longitudinal observational study was carried out in 75 patients with OC from January 2016 to December 2016 in LD Hospital, Government Medical College.
College Srinagar (Jammu and Kashmir). Patients who fulfilled the inclusion criteria, i.e., with pruritus and deranged liver function test (LFT) were taken in the study. Informed consent was obtained from all the patients. The demographic data, complete history with evaluation of risk factors including history of oral contraceptives intake, gallstone, and family history of ICP were taken. The gestational age at which pruritus occurred was noted. Jaundice was noticed on examination. Investigations such as complete blood profile, coagulation profile, and hepatic viral serology were done.

At the time of delivery, the gestational age, the onset of labor, and the mode of delivery were noted. Intrapartum complications were observed. Neonatal outcome and complications including meconium aspiration and fetal distress along with admission of newborn to nursery or neonatal intensive care unit (NICU) were analyzed. Statistical analysis was performed on all the data obtained.

RESULTS

During the study, 83 women were diagnosed with OC, but 8 women did not give the consent for the study so excluded from the study. A maximum number of patients were primigravidae and in the age group of 21-25 years, and mean age was 24.79 years (Tables 1 and 2).

The cardinal symptom of ICP was pruritus after 28 weeks of gestation (about 58.67%) and was noticed more on palms and soles during winters (Figures 1 and 2).

Using pregnancy specific ranges for the LFTs, it was found that the most frequent abnormality encountered in OC was elevated transaminases. There was significant rise in the serum bilirubin level which was noticed in 29.34%. The aspartate aminotransferase (AST) levels were also significantly raised, upper level being AST >300 mg/dl in 10.66% and was 100-200 in 38.67% of patients. The serum alkaline phosphatase was 400-600 in 38.67% of patients (Table 3).

Out of 75 patients, 10.67% had preterm delivery, whereas 50.67% had spontaneous onset of labor, and mean gestational age was 38 weeks 4 days. Induction of labor was done in 38.67% of patients. Maximum number of patients, i.e., 57.33% had vaginal delivery. Lower segment cesarean section (LSCS) was done in 38.67% and in 18% LSCS was done for obstetrical indication. In 4% of cases, the patients underwent instrument delivery (Figure 3).

Table 1: Distribution of patients according to age

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤20</td>
<td>5 (6.67)</td>
</tr>
<tr>
<td>21-25</td>
<td>35 (46.67)</td>
</tr>
<tr>
<td>26-30</td>
<td>28 (37.33)</td>
</tr>
<tr>
<td>&gt;30</td>
<td>14 (9.33)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of patients according to parity

<table>
<thead>
<tr>
<th>Parity</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P - 0</td>
<td>47 (62.67)</td>
</tr>
<tr>
<td>P - 1</td>
<td>19 (25.33)</td>
</tr>
<tr>
<td>P - 2</td>
<td>6 (8)</td>
</tr>
<tr>
<td>P - 3</td>
<td>3 (4)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100)</td>
</tr>
</tbody>
</table>

Table 3: Distribution of patients according to liver function tests

<table>
<thead>
<tr>
<th>LFT</th>
<th>Number of patients n=75 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum bilirubin (mg/dl.)</td>
<td></td>
</tr>
<tr>
<td>0.2-0.6</td>
<td>31 (41.33)</td>
</tr>
<tr>
<td>0.6-1.0</td>
<td>22 (29.33)</td>
</tr>
<tr>
<td>1.0-1.4</td>
<td>17 (22.67)</td>
</tr>
<tr>
<td>≥1.4</td>
<td>05 (06.67)</td>
</tr>
<tr>
<td>AST (IU/L)</td>
<td></td>
</tr>
<tr>
<td>0-100</td>
<td>23 (30.67)</td>
</tr>
<tr>
<td>100-200</td>
<td>29 (38.67)</td>
</tr>
<tr>
<td>200-300</td>
<td>15 (20.00)</td>
</tr>
<tr>
<td>≥300</td>
<td>08 (10.66)</td>
</tr>
<tr>
<td>ALT (IU/L)</td>
<td></td>
</tr>
<tr>
<td>0-100</td>
<td>31 (41.33)</td>
</tr>
<tr>
<td>100-200</td>
<td>25 (33.33)</td>
</tr>
<tr>
<td>200-300</td>
<td>14 (18.67)</td>
</tr>
<tr>
<td>≥300</td>
<td>05 (06.67)</td>
</tr>
<tr>
<td>Serum ALP (IU/L)</td>
<td></td>
</tr>
<tr>
<td>&lt;200</td>
<td>12 (16.00)</td>
</tr>
<tr>
<td>200-400</td>
<td>26 (34.67)</td>
</tr>
<tr>
<td>400-600</td>
<td>29 (38.67)</td>
</tr>
<tr>
<td>≥600</td>
<td>08 (10.66)</td>
</tr>
</tbody>
</table>

LFT: Liver function test, AST: Aspartate aminotransferase, ALP: Serum alkaline phosphotase, ALT: Alanine aminotransferase
Intrapartum complication in the form of meconium staining was observed in 25.33%, and LSCS was done for the same in 27% of patients.

Perinatal outcome was uneventful in 61.33% of patients. Poor perinatal outcome was observed in 38.67% of neonates. A total of 2 patients had IUD and one patient had still birth. Nearly 9.33% of the neonates had low birth weight and A/S was favorable in majority of neonates and 12 (16%) newborn babies required admission in neonatal intensive care unit (NICU) because of meconium aspiration (Figure 4).

In our study, 29.34% had elevated bilirubin and LFT was mildly deranged in most of the patients and these findings were consistent with that of Rashid and Mazhar. Mean gestational age of the women was 38 weeks 4 days in our study while as Rook et al. found mean gestational age 37 weeks.

Incidence of preterm delivery is 10.67% in our study consistent with Alsulyman et al. with 14% incidence of preterm labor in their study.

Nearly two-third of the patients had spontaneous onset of labor and in 29 patients, i.e., (38.66%) induction of labor was done because of cholestasis of pregnancy.

Aloknanda and Rashne had reported that 68.75% had spontaneous onset of labor, whereas as Heinonen and Saarikoski, found 12.5% that had undergone labor induction for cholestasis of pregnancy. In the present study, pregnancy outcome was good in induced group, i.e., 65.78% had vaginal delivery and LSCS was done in 34.22% of patients, whereas Aloknanda and Rashne found LSCS rate in induced group as 33.3% which was higher than in spontaneous onset group.

Most of the patients had vaginal delivery but LSCS was done in induced group due to meconium and fetal bradycardia. Fetal distress was common after 38 weeks of gestation. Kenyon and Girling 2002 reported LSCS in 36% of his patients.

OC of pregnancy poses little risk to mother but a significant risk to fetus such as preterm delivery, fetal bradycardia, meconium staining of liquor, and intrauterine death also.

Hani et al. found increased incidence of fetal asphyxia in women with IHCP.

Maternal morbidity, i.e., PPH was seen in 16% of patients. Rashid and Mazhar had PPH in 20% of patients in their study while as Aloknanda and Rashne found a higher

The aim of this study was to describe the nature and outcome of OC. The true incidence may be varying because ICP is not assessed commonly and pruritus is overlooked easily when clinical symptoms may be mild or develop near term.

On analyzing the data, the maternal mean age in our study was 24.79 years; this was consistent with the study of Aloknanda and Rashne who found mean age of 24.7 years in their study. About two-third of patients were primigravida (62.67%). Padmaja et al. found in his study that ICP was present mostly in primigravidae (71.8%) whereas Singh et al. also found that 52% of patients were primagravidae in their study.

About 73.33% of patients were having symptoms in winter season while as only 26.67% presented with pruritus in summers.

In our study, 29.34% had elevated bilirubin and LFT was mildly deranged in most of the patients and these findings were consistent with that of Rashid and Mazhar. Mean gestational age of the women was 38 weeks 4 days in our study while as Rook et al. found mean gestational age 37 weeks.

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Hani et al. found increased incidence of fetal asphyxia in women with IHCP.

Maternal morbidity, i.e., PPH was seen in 16% of patients. Rashid and Mazhar had PPH in 20% of patients in their study while as Aloknanda and Rashne found a higher
incidence of PPH nearly one-fourth of patients in their study (25%).

Poor perinatal outcome was seen in nearly one-third of neonates, i.e., 38.67% of neonates consistent with the study of Rook et al. who reported fetal complication in 33% of patients with ICP, whereas Padmaja et al. found meconium staining in 17.8% of patients. In this study, 16% of neonates required admission in NICU because of meconium aspiration and prematurity almost consistent with Keyon et al. 2002 reported 14% NICU admission.

CONCLUSION

OC occurs in the final months of pregnancy with pruritus as a cardinal symptom. It is associated with increased maternal morbidity and perinatal mortality and morbidity. Close monitoring in antenatal period and induction of labor at 37-38 weeks may improve perinatal outcome.

REFERENCES


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Yoga as a Health Promotion Lifestyle Tool: A Study on Medical Students from a Tertiary Care Centre

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Abstract

Introduction: Yoga has an important role in prevention and treatment of lifestyle-related diseases. One of the important components of Yoga is Pranayama. Physiologically, the benefits of pranayama can be described by more oxygen availability to all tissues of body by an increase in alveolar ventilation and improvement of respiratory muscle’s strength and lung volumes by its regular practice.

Aim of the Study: To find out the beneficial effect of the Yoga in body and mind of the young medical students.

Materials and Methods: A total of 26 medical students between the age of 18-25 years from Shri Ramachandra Bhanj Medical College, Cuttack, Odisha, were taken for the study and the period of study was from June 2016 to December 2016.

Results: The male to female ratio was 16:10. The general feeling of well-being improved a lot. The mental performances such as memorization, sleep quality and duration, and betterment of mood were observed to be improving.

Conclusion: Yoga is one of the most efficient and an integrated technique for mind-body management.

Key words: Lifestyle tool, Non-communicable diseases, Pranayama, Yoga

INTRODUCTION

The word Yoga is derived from the Sanskrit word “to join” or “unity.” It is described in spiritual terms as union of the individual consciousness with the universal consciousness. In another term, Yoga is the “union of mind and body” for balancing and harmonizing the physical and mental functions of body. This is done through the practice of physical postures (asana), breathing control (pranayama), and meditation.

Yoga is a way of life, which originated thousands of years ago from India. Patanjali described eight steps or “limbs” of Ashtunga Yoga. Yoga has an important role in prevention and treatment of lifestyle-related diseases. One of the important components of Yoga is Pranayama. Physiologically, the benefits of pranayama can be described by more oxygen availability to all tissues of body by an increase in alveolar ventilation and improvement of respiratory muscle’s strength and lung volumes by its regular practice.

There are five ‘Ts’ of non-communicable diseases (NCDs) which act as risk factors for these diseases. These ‘Ts’ are Tummy, tobacco, tension, trans fats, and life full of sedentary activities. Yoga by its very inherent nature is helpful to make the body active, introspective, and calm. It discourages tobacco and trans fats, thus reducing the risk factors of NCDs. There are enough data that suggest Yoga is effective in cardiovascular diseases (CVD), stroke, diabetes mellitus, mental disorders, etc., The coronary artery disease (CAD) risk in the offspring can also be reduced by doing appropriate Yogasana and avoidance of smoking by expectant mother.

Yoga originated from India thousands of years ago. It has been described in Bhagavad Gita and Patanjali Darshan,1,2
Bhagavad Gita defines it as lifestyle with consuming appropriate food, doing appropriate exercise, discharging duties properly, going early to bed, and getting up early. All these comprise Yoga and are shot way of remaining healthy without suffering. This definition is comparable to an aphorism quoted by Peter McDonald - there best physicians are: The doctors quite, and doctors’ merry man.3

Patanjali is known as the father of modern Yoga. He described Yoga as Yoga Chitta vritti Nirodhah for the positive effects of Yoga on mind in his Yoga sutras. It means “Yoga steadies one’s mind”. He described Ashtanga Yoga as a tree which comprises eight steps, or “limbs” include “Yama” and “Niyama” (a code of conduct for an ethical lifestyle), “Asana” (physical postures), “Pranayama” (breath control/yogic breathing), “Pratyahara” (withdrawal of the senses from external objects to increase self-awareness), “Dharana” (concentration), “Dhyana” (meditation), and “Samadhi” (oneness with the object of meditation).4 Patanjali did not mention about tobacco or smoking because tobacco was unknown and unheard of during that period.

Yoga functioning can be compared with functioning of computer: Yama-software, Niyama software, Asana hardware, Pranayam hardware, Pratyahara software, Dharana software, Dhyana software, and Samadhi software. All limbs of Yoga are complementary to each other.

Yoga has become a popular method of physical and mental well-being and has as important role in the prevention of lifestyle-related diseases. It also has place as an adjuvant with the medicines in treating the chronic diseases related with a lifestyle such as diabetes, CVDs, and asthma. Yoga has been adapted for use in complementary and alternative medicine in Indian as well as western society.

**Aim of the Study**
The aim of the study was to find out the beneficial effect of the Yoga in body and mind of the young medical students.

**MATERIALS AND METHODS**
A total of 26 young medical students between the age of 18-25 years from Shri Ramachandra Bhanj Medical College, Cuttack, Odisha, were taken for the study and the period of study was from June 2016 to December 2016.

**RESULTS**
The male:female ratio was 1.6:1 (Table 1). The improvement of the students on certain factors after 6 months of Yoga was collected and highlighted in Table 2 with percentage data. The improvement was found by decreasing tension, good health, possible quit of tobacco, decreasing obesity, increasing chest expansion, increasing calmness of mind, increasing quality of sleep, sleep duration, and memorization.

**DISCUSSION**
Pranayama is of many types such as anuloma viloma, surya bhedan, bhramari, and bhashrika but the core concept of all types is to take a deep (high depth) and slow breath (less rate). It conserves energy and recharges the tired cells. As we all know, 1“ 150 ml of air, out of 500 ml tidal volume in each breath is not used for gaseous exchange called as dead space air, by practice of yogic breathing, there is more alveolar ventilation for the same respiratory minute volume and finally more oxygen is available to all tissues of body during Pranayama. Alveolar ventilation is significantly high in pranayama/yogic breathing as compared to normal breathing. Therefore, more oxygen can be extracted and available for tissues during yogic breathing. Better oxygen availability to tissue level is very helpful in reducing the tissue stress and daily wear and tear. Hence, Pranayama can help in the prevention of NDCs.

If a person practices pranayama daily (means inspiration with more depth and fewer rates consciously), after a time period, he will develop a habit of slow and deep breathing unconsciously throughout the day. By this way, there will be an increase in availability of oxygen to tissue not only during pranayama but also throughout the day. Thus, daily practice of pranayama may increase the lifespan by keeping tissue more healthy for longer time (we know our rishi-munis who lived long life by practicing pranayama).

**Table 1: Sex ratio of the students in the study**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
</tr>
</tbody>
</table>

**Table 2: Post-Yoga improvement in certain factors**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Post-Yoga status improvement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension (n=22)</td>
<td>Yes 22 (100)</td>
</tr>
<tr>
<td>Health (n=20)</td>
<td>Yes 16 (80)</td>
</tr>
<tr>
<td>Tobacco quit (n=6)</td>
<td>Yes 6 (100)</td>
</tr>
<tr>
<td>Obesity (n=6)</td>
<td>Yes 4 (66.67%)</td>
</tr>
<tr>
<td>Chest expansion (n=26)</td>
<td>Yes 20 (76.92%)</td>
</tr>
<tr>
<td>Calmness (n=26)</td>
<td>Yes 26 (100)</td>
</tr>
<tr>
<td>Sleep quality (n=26)</td>
<td>Yes 23 (92.31%)</td>
</tr>
<tr>
<td>Sleep duration (n=26)</td>
<td>Yes 21 (80.76%)</td>
</tr>
<tr>
<td>Memorization (n=26)</td>
<td>Yes 26 (100)</td>
</tr>
</tbody>
</table>

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Moharana, et al.: Yoga as a Health Promotion
Yogic breathing also helps in improvement of respiratory muscle’s strength and lung volumes, thus further increasing the availability of oxygen to tissue. It was shown that 2 months the pranayama, yoga breathing and stretching postures are used to increase respiratory stamina, relax the chest muscles, expand the lungs, raise energy levels, and clam the body supporting this study.\(^5\)

Human body is composed of trillions of microscope cells which are the building blocks of body organs and systems. The cells get tired and exhausted after daily wear and tear and a time comes when they die. The dead cells are to be regenerated or replaced so that our vitality is restored. Exercise and Yoga are the most economical and easy method of charging the tired and exhausted cells. It looks anachronistic to think that exercise would energize the tired body. It is something such as charging the mobile phone battery, cameras, or watch routinely when they are discharge completely and rendered useless for any operations. Exercise and Yoga charges the body cells in the same way so that our physical, mental, and spiritual faculty remains active and agile all time and it is an efficient adjuvant for management of NCDs.\(^6\)

There are five “Ts” of NCDs which act as risk factors. These five “Ts” are tummy tobacco, tension, trans fats, and life full of sedentary activities. Major NCDs, which are prevalent in India, are diabetes, hypertension, stroke, cancer, and CAD. Yoga is very helpful to make the body active, energize, and in reducing the risk factors of NCDs. Yoga is for physical, mental, and spiritual health without spending single penny.

Yoga is a way of living associated with several health benefits. The possible contributions of Yoga healthy living have been studies, and many positive correlations have been made. Yogic lifestyle is beneficial for health of almost all organ system of the body. Some important ones are discusses below.

**Cardiovascular Benefits**

We are all aware that prevalence of CAD, diabetes and other lifestyle-related diseases is increasing in India. Approximately 5.8 million Indians die from heart and lung diseases, stroke, cancer, and diabetes every year. High-level stress, sedentary, and distorted lifestyles are important contribution factors for this increment. Benefits of Yoga in the modification of cardiovascular risk factors and in the rehabilitation of cardiovascular risk factors and in the rehabilitation of the postmyocardial infarction patient are areas well documented.

Pranayama, meditation, ad asana are very helpful for preventions as well as reduction in the complication of cardiovascular problems. Shavasana has a very beneficial role in reduction of high blood pressure. First to report the beneficial role of Yoga in hypertension was Dr. Datey and Dr. Udupa from India.\(^7,9\) Dr. Udupa from Banaras Hindu University observed a statistically significant fall in both mean systolic and diastolic pressure after 6 months of proper practice of Shavasana in hypertensive patients. He also found a significant reduction in needed doses of antihypertensive drugs in Yoga practitioner. In patients with mild hypertension, blood pressure could be controlled with Shavasana only, and no drug was needed in them at all. Sarvangasana has been also shown to be particularly beneficial in preventing and treating hypertension-associated left ventricular hypertrophy and diastolic dysfunction.\(^10\) Both Shavasana and Sarvangasana cause their beneficial effect by increase in parasympathetic activity and attenuation of sympathoadrenal and renin-angiotensin activity. Meta-analysis of 44 randomized controlled trials with a total of 3168 participants revealed evidence of effects of Yoga on reduction of most biological CVD risk factors such as systolic and diastolic blood pressure, heart rate, waist circumference, waist/hip ratio, and cholesterol.\(^11\)

Meditation has similar effects on the cardiovascular system as that of the beta-blocker drug. It helps patients lower their blood pressure, stress, and anger compared with patients who only attend a health education class. Those practicing meditation also lowered their blood pressure and reported less stress and anger and had greater survival. Slow breathing, as in practice of pranayama, enhances heart rate variability and baroreflex sensitivity by resynchronizing inherent cardiovascular rhythms and helps in prevention as well as in the treatment of CVD; It is also already shown that the practice of yogic postures restores baroreflex sensitivity which is impaired in essential hypertension.\(^12\) Practitioner of Yoga abhors any kind of addiction such as tobacco-related cardiovascular or pulmonary diseases.

It has been observed that the recitation of the holy rosary and Yoga mantras (chanting) slowed respiration to almost up to six breaths per minutes, and enhanced heart rate variability and baroreflex sensitivity.\(^13\) Yogic practice, through the restoration of baroreceptor sensitivity, progressive attenuation of sympathoadrenal, and renin-angiotensin activity, caused a significant reduction in the blood pressure of patients who participated in Yoga exercise.\(^14\)

Lifestyle diseases, participated CAD, have been noted to be the most important cause of the morbidity and mortality all over the world. The main causative factors for CAD are: Smoking/tobacco, physical inactivity, faulty diet, hypertension, diabetes, high level of cholesterol, and stress. Lifestyle modifications such as change in smoking/tobacco
habits, control of hypertension, diabetes, and lipid profile are very helpful in prevention of CAD development.\(^{13}\)

Yoga may help in prevention of CAD by reducing stress and producing several cardioprotective effects.\(^{16}\) In many studies, it has been shown that Yoga exerts cardioprotective effects by lowering blood pressure, body weight, blood sugar, and lipids studies also shown that Yoga may be useful for prevention and regression of early and advanced coronary atherosclerosis.\(^{14,17-20}\) The beneficial role of Yoga in ameliorating blood pressure and its inherent component of negating blood pressure and its inherent component of negating any type of addiction, i.e., no tobacco and no alcohol, provide additional benefits in recovery of stroke patients.

Yoga and diabetes mellitus: Diabetes is fast gaining the status of a potential epidemic in India with more than 65 million diabetic individuals currently diagnosed with the disease. The prevalence of diabetes is predicted to double globally from 171 million in 2000-366 million in 2030 with a maximum increase in India.

Genetic factors and environment factors such as sedentary lifestyle, obesity, physical inactivity, and excess calories intake play an important role in the development of diabetes. Visceral adiposity is associated with insulin resistance and metabolic syndrome by producing tumor necrosis factor-\(\alpha\), interleukin-6 (IL-6), resistin, vistafin, adiponectin, interferon-\(\gamma\), and many other inflammatory cytokines. Lifestyle modification including increased physical activity and dietary modification weight reduction are important primary prevention strategies for diabetes in high-risk individuals, Yogasana, pranayama, and meditation have been considered as simple and economical therapies which can be used along with drug therapy of diabetes.

Short-term Yoga intervention programs have been shown to be beneficial for reducing the diabetes risk factors. By only 10 days Yoga practice, significant reduction in body weight, body mass index, waist-hip ratio, blood glucose level, median fasting insulin, and IL-6 were observed in a study carried in subject with prediabetes.

Long-term Yoga practice is associated with increased insulin sensitivity and attenuation of the negative relationship between body weight or waist circumference and insulin sensitivity. Various yogic postures have been noted to increase the sensitivity of \(\beta\) cells of the pancreas to the glucose signal. It is also postulated that practice of Yogasana may reduce the overall requirement of oral hypoglycemic drugs.

Yoga and mental disorders: In this era of life full with stress and strain Yoga has proved to be a panacea of several psychosomatic disorders ranging from CAD to diabetes and cancer including its beneficial role in tobacco cessation and alcohol de-addiction. Yoga shows several beneficial physiological effects related to mental health. Depression is well-recognized to be associated with hypercortisolemia as a result of hyperfunctioning of hypothalamic–pituitary–adrenal axis. High cortisol is also found in increased stress condition. Yoga is effective in both types of disorders, i.e., stress and depression. Decreases in cortisol and increase in neurotrophic factors (BDNF), heart rate variability, and gray matter volume have been reported after Yoga practice.

Yoga is also helpful in maintaining the normal brain health and its proper functioning. A recent study suggested that a 6 weeks concentration, attention, memory, eye–hand coordination, and mental calculation ability, sequential or linear learning, etc.

Cutting CAD risk in offspring at birth: There are several steps which an expectant mother should undertake for the cardiovascular safety of her offspring developing in her womb. There is ample evidence now to prove that parental weight is a risk factor of the development of obesity in children. Weight of mother and father both affect the children body mass. Studies have shown that maternal smoking during pregnancy is associated with overweight and obesity in offspring. Further, high body mass index during early years of life increase CVD risk factors in lateral life. Therefore, doing appropriate Yogasana and avoidance of smoking by expectant mother can reduce the CAD risk in the offspring. Even if practiced correctly Yogaes initial two step that is ‘Yama’ and ‘Niyama’, it will be beneficial for mother as well as offspring. Quite realizing it’s primitive, particularly its intellect sharpening, effect, and preventive potentials Yoga is being popularized in school going children and expectant mothers. Yoga postures, namely, Vakrasana (twisted pose), Parvatasana (mountain pose), Bhadrasana (butterfly pose), and Shavasana (corpse posture) - are being advocated among pregnant mothers. There is a word caution that this should be taught by trained Yoga teachers and not by a novice o merely seeing pictures and practicing thereafter.

Yoga was propounded by ancient Indian ascetics and thinkers, but over the years there are several countries where researchers and practitioners of Yoga accepted and are practicing this science. Although practiced universally, there is a lot of myth surrounding this ancient practice. Some people say that Yoga is specific to Hindu religion, but it is not. Yoga is a scientific discovery of the way of self-transformation for well-being. Yoga is for all people of world in the same as any scientific discovery such as invention of electricity, internet, and all other electronic, and nonelectronic items. It is a science of integrating body,
mind, and soul, Yoga has very important role in prevention
and adjuvant treatment of lifestyle-related diseases. Thus to
conclude, Yoga is not specific to any religion, community,
or country, rather it is for all.

India has rich tradition of healing by different systems
of medicine, popularly known as Ayurveda, Yoga, Unani,
Siddha, homeopathy, and naturopathy since long. Among
these, Ayurveda and Yoga are important ancient heritage to
tackle health and illness. The importance of self-discipline,
yogic exercise, and herbal remedy in cardiovascular health
has attracted the modern medicine scientists and doctors
from all over the world for undertaking translational
research in this area.

It is, therefore, necessary that MBBS doctors should know
the basic principles and approaches of ancient systems
of India. This sensitization would help them to prescribe
medicines from Ayurveda, Yoga Unani, and Siddha. It will
also help hs patients in a comprehensive way. To being with,
some classes should be introduced to sensitize medical
graduates to other Indian system of medicine along with
allopathic during their medical training period.

CONCLUSION

Yoga is one of the most efficient and an integrated
technique for mindbody management. It is cost-effective
and efficient method for the prevention of CVDs if
practiced in a holistic way. There is need to evolve uniform
strategy models of Yoga for clinical applications to develop
easily accessible Yoga therapy services in hospital.

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Knowledge, Attitude, and Practice of Ocular Topical Steroid Self-use in and Around Kishanganj, Bihar

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Abstract

Background: It has been observed that majority of rural patients attending eye outpatient department (OPD) in a tertiary care hospital at Kishanganj, Bihar, are in the habit of misusing steroid medications through self-medication, treatment by quacks, pharmacists, and general practitioners for various eye conditions which can lead to various complications in eye.

Materials and Methods: We conducted a prospective, cross-sectional study in ophthalmology OPD at tertiary care hospital in Kishanganj, Bihar.

• A total of 56 patients of both sexes, aged between 18 and 70 years who visited hospital for the first time in eye OPD from July 2015 to June 2016 were interviewed.
• All patients underwent a short semi-structured questionnaire, especially prepared by the author. The results were statistically analyzed to come to a conclusion.

Results: A total of 56 patients reported using eye drops. Only 18 of them were using steroid eye drops of their own with or without antibiotics or other substances. By calculating binomial probability and normal approximation, even with this small sample, it can be inferred that a significant number of patients do use self-prescribed steroid eye drops ($P < 0.02$).

Discussion: Out of 56 patients who reported using eye drops of their own, only 18 were found to be using steroid eye drops with or without antibiotics or other substances. The most common cause among the symptoms, for which eye drops are used abruptly and unscientifically without proper prescriptions of qualified ocular consultants, is redness and itching of the eyes. Sometimes, these are prescribed by local general practitioners, but more commonly advised by chemist’s shop people, quacks, friends, and relatives and also on self-advice or simply because an old vial is available ready at the hand. Most of them use only when the problem is irritating. Interestingly, more than 50% are not benefitted by the drop. About 20% are totally ignorant about the side effects.

Conclusion: There is a menacing state of affairs in rural/semi-urban areas of Eastern India regarding misuse of eye drops, at least in regions of our study, which begets bigger multicentric studies, and also, immediate measures should be taken to improve awareness and literacy on this issue.

Key words: Misuse of eye drop, Ocular medicine, Topical steroids

INTRODUCTION

It has been observed that majority of rural patients attending eye outpatient department (OPD) at tertiary care hospital at Kishanganj, Bihar, are in the habit of misusing steroid medications through self-medication, treatment by quacks, pharmacists, and general practitioners for various eye conditions which can lead to various complications in the eye. Corticosteroid has been used in ophthalmology for almost 70 years.1 Steroid medication is useful in many conditions such as noninfectious uveitis, graft rejection, allergic disorders including vernal keratoconjunctivitis and atopic keratoconjunctivitis to control post-operative uveitis, and many more.2 However, misuse of steroid can lead to severe eye-threatening complications. Adverse reactions of topical steroids include in decreasing order of frequency: Elevation of intraocular pressure with possible development of glaucoma and infrequent optic
nerve damage, posterior subcapsular cataract formation, and delayed wound healing. Although systemic effects are extremely uncommon, there have been rare occurrences of systemic hypercorticoidism after use of topical steroids. Corticosteroid-containing preparations have also been reported to cause acute anterior uveitis and perforation of the globe. Keratitis, conjunctivitis, corneal ulcers, mydriasis, conjunctival hyperemia, loss of accommodation, and ptosis have occasionally been reported following local use of corticosteroids. These steroid medications are easily available at low cost without prescription at various pharmacy shops and are often prescribed by self, pharmacists, quacks, etc., for various diseases of eye. In our OPD, we have observed that rural patients visiting our hospital were unaware of complications of these steroid medications and were in the habit of using them without any prescription. The objective of our study was to make a qualitative research on the knowledge, attitude, and practice of eye drop usage in a semi-urban setup through structured questionnaire.

MATERIALS AND METHODS

A thorough study was carried out to assess the knowledge, attitude, and practice on the usage of topical steroid medication for eye among patients visiting our hospital. This study did not only assess the gray area in the eye care but also helped us to come to know the gaps in delivering them. We conducted a prospective, cross-sectional study in ophthalmology OPD at tertiary care hospital in Kishanganj, Bihar.

A total of 75 patients of both sexes, aged between 18 and 60 years who visited hospital for 1st time in eye OPD during the period of a whole month of June were interviewed.

All patients underwent a short semi-structured questionnaire, especially prepared by the author.

The questionnaire collected demographic data such as patient’s age, gender and level of education and also details concerning the knowledge, attitude and practice on ocular eye drop usage.

All participants were informed about the scope and purpose of the study and told that it was voluntary to participate, without any compensation, and that their medical assistance would not be compromised if they refused or decided to participate in the survey. The types of medication used were classified into the following groups: Antibiotics, steroids, combination of antibiotics and steroids and other drugs not included in the previous classifications. When the patient used preparations that included two or more drugs, each of these associations was considered separately. When the interviewed subject failed to remember the drug used, first they were shown steroid medication easily available in the area to identify if they used any one of them; however, if they still failed to remember the drug, the answer was included under the category of failed to remember.

Regarding educational level, four divisions were established:
1. Illiterate
2. Basic/primary education
3. Completed matriculation
4. Graduation and above.

The age groups were arbitrarily assigned: <18-40 and 41-60.

Out of 56 patients: 25 patients were between 18 and 40 years and 31 were between 41 and 60 years.

RESULTS

From our survey, we got our result as:

\[ n = \text{Number of samples, i.e., 56 patients who were reported using of eye drops of their own} \]
\[ r = \text{Only 18 patients who were using steroids eye drops with or without antibiotics and/or other substances} \]
\[ P = \text{Probability of using this type of drugs} = 0.20. \]

The binomial distribution is as follows:

In sampling from a stationary Bernoulli process, with the probability of success equal to \( p \), the probability of observing exactly \( r \) successes in \( N \) independent trials is:

\[ P(X=r) = \binom{n}{r} p^r (1-p)^{n-r} \]

Whenever the sample size is large, you can use the normal distribution to approximate the exact probabilities of the items of interest.

As a general rule, you can use the normal distribution to approximate the binomial distribution so that, for large enough \( n \), the random variable \( Z \) is approximately normally distributed.

Therefore, normal approximation to the binomial distribution is application of \( Z \) test as follows:

\[ Z = \frac{X - np}{\sqrt{np(1-p)}} \]

In short, 1st step – We have calculated binomial probability to find out the probability of getting how a good proportion of patients using antibiotic and steroids eye drops.
2nd step – From the binomial probability we have calculated the normal approximation to the binomial proportion (through Z test)

3rd step – To find out the $P$ value for Z test for significance level.

Finally, we get our result as:

$$Z = +2.11 \text{ with binomial mean } 11.2 \text{ and binomial standard deviation}=2.99.$$  

The $P$ value is 0.017429. The result is statistically significant at $P < 0.02$.

**DISCUSSION**

In our study, it has been found that out of 75 patients included initially in our study, 56 patients reported using eye drops without proper consultation and of them 18 used steroid eye drops with or without antibiotics and or other substances. By calculating binomial probability and normal approximation, even with this small sample, it can be inferred that a significant number of patients do use self-prescribed or at least improperly prescribed steroid eye drops ($P < 0.02$).

The most common cause among the symptoms, for which eye drops are used abruptly and unscientifically without proper prescriptions of qualified ocular consultants, is redness and itching of the eyes (63%). The subsequent causes are pain in the eyes (14%), watering from the eyes (15%), and incidences if trauma in the eyes (8%) (Figure 1). Sometimes, these are prescribed by general practitioners and quacks (94%) but are not infrequently advised by chemist shop (28%) and because simply an old vial is available which is ready at the hand (23%) (Figure 2). Often, they are advised by friends and relatives. Most of the patients use a steroid eye drop only when the problem is very irritating. Interestingly, more than 50% of the patients are not benefitted by the eye drop. About 20% of the patients are totally ignorant about the side effects.

It cannot be overemphasized that the knowledge of the composition of commonly used eye drops through self-medication as well as their side effects is extremely poor in the Indian subcontinent, through the practice is very much common and the attitude is simply indifference.4

In a study in Mangalore by Kadri et al.,5 it was found that out of 327 patients included in the study from OPD, 116 (35.47%) used eye drops of their own. They did not consult any qualified eye specialist for this purpose. A total of 115 (99.1%) of the patients were not aware about what the eye drops were 59.4% of the patients misusing eye drops who had basic school education, 19.8% were illiterates, and the rest (20.8%) were graduates and above. Improvement in the symptoms was seen in 63.8% of patients (compared to <50% in our study), and 9.5% had worsening of their symptoms. In 86.3% of the patients, easy accessibility was the chief motivation behind this self-medication; other motivating factors were time-saving (12.7%) and reduction in expenses (1%).

In another study from Bangkok by Tayanithi et al.6 on self-medication with over the counter (OTC) ophthalmic preparations, the most common factor for which such usage was “dust in the eye” (55%). The second most common cause for using such eye drops was itching, irritation, and tears from the eyes.

Decongestant eye drops are the most commonly used OTC eye drops. These types of eye drops often lead to both acute and chronic conjunctivitis. Tappeiner et al.8 have observed that abuse of vasoconstrictive eye drops can cause ocular pemphigoid.
Blindness from the misuse of the OTC eye drops has also been reported. The said study reported that four patients because blind because of self-use of ocular decongestant in angle closure glaucoma. These drugs may augment existing mydriasis or may precipitate it, it used in excessive amount. Obviously, it cannot be estimated for sure the number of case of blindness occurring due to misuse of OTC decongestant eye drops, particularly for prolonged period. Therefore, it is best to infer that all patients when diagnosed as a case of “narrow-angle glaucoma” should strongly be advised by the treating ophthalmologist that future throughout his life, the patient should not indulge in any ocular self-medication so as to prevent any unwanted blindness in future.

In another study, in Owo, Nigeria, it was designed to study the proportion of patients in that population, who practice ocular self-medication, the substances employed and the reasons for resorting to that thereby. It was found that majority of the respondents (79%) admitted to using ocular self-medication and only the rest (21%) did not practice it. The substances used were of different types including steroids, antibiotics, and herbals. However, interestingly, 25 of them admitted that they used spiritually conditioned and/or blessed eye preparations. The reasons cited by respondents for resorting to self-medication which included their perceptions that the type of ocular diseases they had were minor enough to be amenable to self-care. The other reasons cited were a lack of readily available ophthalmic services, financial constraints to availing specialist care, ignorance of the potential adverse effects of self-medication, certainly of the efficacy of the self-medication used, and lack of escorts to take them to an eye care hospital. Their suggestions were that adequate health education is needed to stop the unwanted practice of ocular self-medication and also efforts of making eye care available and accessible to all should be intensified.

CONCLUSION

The relevant data from our pilot study state that there is a lack of knowledge regarding self-medication with various eye drops among the population of Kishanganj area though it is quite prevalent in the said location. It is also deduced from statistical analysis that the misuse of topical ocular steroids is significant. The practice of medication without proper prescription and that with topical steroids when highly prevalent may lead to many complications.

However, our studies do have several limitations. First, the inference has been drawn from a relatively small number of participants. Second, not all patients revealed the truth because of the fear factor commonly prevalent among rural populations. Anyway, this is only a pilot study. A more detailed study with a much larger population might be ventured in near future.

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Prevalence and Distribution of Different Types of Bone Defects in Chronic Periodontitis In Bagalkot Subjects - A Clinical Study

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Abstract

Background: Chronic destructive periodontitis involves resorption of the bone supporting the teeth. Various treatment aspects of this disease depend on the amount of alveolar bone remaining around the teeth. Hence, it is important to know the exact topography of the bone loss which is best possible by direct viewing during surgery. The aim of the study was to determine the prevalence and distribution of the various types of bone defects; its relation with adverse habits and the segment wise distribution in the mandible and maxilla in Bagalkot population.

Materials and Methods: This study was carried out on 200 chronic periodontitis patients of age group 30-70 years using direct observation during periodontal surgery. The association of various osseous defects with age, sex, socioeconomic status (SES), adverse habits, geographical location and trauma from occlusion, arch, and segment-wise were assessed.

Results: There was increased horizontal bone loss with the advancing age and males were more affected. More number of defects was seen in the posterior segment. No statistically significant relation was found between the SES, geographic location, and between the two arches. Among bony defects, craters were the most common angular bony defects and were found to be related with the trauma from occlusion and adverse habits.

Conclusion: The prevalence and distribution of bone defects are multifactorial and was not related to one cause. It is related to the age, sex, SES, adverse habits, and the anatomy of the bone.

Key words: Bone defects, Chronic periodontitis, Periodontal surgery

INTRODUCTION

Alveolar bone loss is one of the most important features of periodontal disease. The variation in patterns of bone loss between individuals and between different sites in the same mouth, the rate of the bone loss, and the diversity of form of loss have stimulated a great deal of interest and speculation¹ alveolar bone is as vital a tissue as the gingiva, pulp, or periodontal ligament and should be viewed biologically as a living tissue.

With the tremendous progress made in establishing the relative role of the external or the environmental causes of disease, the individual or genetic differences are assuming increasing importance. Periodontal bone loss from periodontitis may be either horizontal, resulting in a regular alveolar crest at a level more apical to the normal, or vertical, leading to the formation of defects contained within the bone. In either case, an increase in the distance between the cementoenamel junction and the alveolar bone crest is evident. An infrabony defect is any defect of the alveolar bone proper, the base of which lies apically to its bony margins. Like other bony deformities, these may be detected by radiographic means, by observing periodontal bone during surgical procedures or by visual examination of the dried skull.² Chronic periodontitis is most common inflammatory periodontal disease which leads to changes in normal architecture of the alveolar processes. These changes vary

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in degree, form, and distribution within the same mouth as well as between individuals. The possible factors in the pathogenesis of the bone defects are tooth anatomy and position, the relationship of adjacent marginal ridges and cementoenamel junctions, and open contact points with resultant food impaction as well as traumatic lesions affecting the attachment apparatus. Many authors have classified bony defects as interdental crater, hemiseptum, inconsistent margins, furcation invasions, infrabony defects with 1-, 2-, or 3-wall defect and combination of these defects. These lesions may also be complicated by the anatomic aberrations of the alveolar process, i.e., thick margins, exostoses, tori, fenestrations, and dehiscence. The existence of bone defects present the specific problems in the clinical practice and direct observation during periodontal surgery is the only means of accurately recording the bone morphology, taking into account the limitations of radiographic examination. To date, very few studies have been done to know the prevalence and distribution of different types of bone defects encountered during periodontal surgery. This study could provide not only the prevalence and distribution but also a better approach in deciding the treatment procedures.

MATERIALS AND METHODS

The study was carried out on 200 chronic periodontitis patients in the age group of 30-70 years referred to the Department of Periodontics, P. M. N. M. Dental College and Hospital, Karnataka, India. Patients were diagnosed of chronic periodontitis after clinical and radiological examination. Patients who had received surgical periodontal treatment previously and patients with self-reported systemic diseases that influence pathogenesis of periodontal diseases was excluded from the study.

Procedure

First, pocket depth was measured and recorded using William's graduated periodontal probe along the long axis of the tooth at four sites around the tooth—mesial, facial, distal, and lingual/palatal. Fremitus was measured using 1-, 2-, or 3-wall defect and combination of these defects. These lesions may also be complicated by the anatomic aberrations of the alveolar process, i.e., thick margins, exostoses, tori, fenestrations, and dehiscence. The existence of bone defects present the specific problems in the clinical practice and direct observation during periodontal surgery is the only means of accurately recording the bone morphology, taking into account the limitations of radiographic examination. To date, very few studies have been done to know the prevalence and distribution of different types of bone defects encountered during periodontal surgery. This study could provide not only the prevalence and distribution but also a better approach in deciding the treatment procedures.

RESULTS

Out of 200 subjects, 116 (58%) patients had horizontal bone defect (Figure 1). In the age group of 30-40 years, 37 (36.6%) patients had craters, 4 (4%) had one-wall defects (Figure 2), 7 (6.9%) had two-wall defects (Figure 3), and 19 (18.8%) with three-wall defects (Figure 4). In the age group of 40-50 years, 5 (9.3%) patients had craters, 1 (1.9%) had two-wall defects, and 8 (14.8%) had three-wall defects. In the age group of 51-70 years, 3 (6.7%) patients with crater defects (Figure 5) were seen. In 125 males, 66 patients had horizontal bone defects, 29 (23.2%) patients had craters, 1 (0.8%) had one-wall defects, 4 (3.2%) had two-wall defects, and 25 (20%) had three-wall defects. Out of 75 females, 50 patients had horizontal bone defects. A total of 16 (21.3%) patients had craters, 3 (4%) had one-wall defects, 4 (5.3%) had two-wall defects, and 2 (2.7%) had three-wall defects. In 74 urban patients, 28 (21.9%) patients had craters, 3 (2.3%) had one-wall defects, 7 (5.5%) had two-wall defects, and 16 (12.5%) had three-wall defects. In 20 periurban patients, 7 (23.3%) patients had craters, 1 (3.3) had one-wall defects, 2 (6.7%) had three-wall defects. Out of 22

\[ \chi^2 = \sum \frac{O - E^2}{E} \]

Where, O=Observed number, E=Expected number.
rural patients, 10 (23.8%) patients had craters, 1 (2.4%) had two-wall defects, and 9 (21.4%) had three-wall defects. Out of 72 low socioeconomic status (SES) patients, 42 had horizontal bone defects, 16 (22.2%) patients had craters, 3 (2.1%) had one-wall defects, 1 (1.4%) were with two-wall defects, and 10 (13.9%) had three wall-defects.

Out of 121 middle SES patients, 69 had horizontal bone defects, 28 (23.1%) patients had craters, 1 (0.8%) had one-wall defects, 7 (5.8%) had two-wall defects, and 16 (13.2%) had three-wall defects. Out of seven upper SES patients, 5 had horizontal bone defects, 1 (14.3%) patients had craters, and 1 (14.3%) had three-wall defects. The association between various defects and geographical location and SES was not statistically significant. Out of 200 patients, only 8 patients were recorded positive with trauma from occlusion (TFO). Among those 3, patients had horizontal bone defects (37.5%), 2 patients had craters (25%), 1 had two-wall defect (12.5%) and 2 patients had three-wall defects (25%). Out of 192 patients without TFO, 113 (58.9%) had horizontal bone defects, 43 (22.4%) patients had craters, 4 (2.1%) had one-walled defects, 7 (3.6%) had two-wall defects, and 25 (13%) with three-wall defects. The association between various defects and trauma from occlusion was also not statistically significant. In the study, 84 patients had angular defects, of craters were present in almost half the number of defects. In the mandible, craters were present in 23 of the posterior and two in the anterior sextant of the mandible. Two one-wall defects were seen.
in the posterior sextant. Two-wall defect was present in one of the anterior and three in the posterior sextant. Three-wall defect was present in one of the anterior and 12 in the posterior sextant. In the maxilla, 20 craters were found in the posterior region. One-wall defect was recorded in one patient in the anterior region and one in the posterior region. Two-wall defect was present in four cases in the posterior segment. Out of 14 three-wall defects, 13 were present in the posterior region and one in the anterior region.

**DISCUSSION**

In the present study, almost half of the various defects were present in the age group of 30-40 years (Graph 1). It was found in accordance with the review that shows vertical defects which does not appear to increase after the age of 50 years. In another study, it was recorded that only 18% of the participants had one or more periodontal intrabony defects, but the prevalence was higher in older than in younger age. Relative higher distribution of intrabony defects might be due to steep increase in bone height loss from the age of 15 through 44 years. After the age of 50 years, there was little or no further alveolar bone loss. In the present study, periodontal bone defects were more in males (Graph 2) when compared to the females (62.5% vs. 37.5%, respectively). Higher distribution of periodontal bony defects in males may be due to the adverse habits such as smoking, tobacco, and betel nut chewing act as risk factors for the periodontal disease. In the present study, association of various bone defects with the variables (smoking, pan chewing, pan masala, tobacco chewing, and betel nut chewing) was studied. A more number of defects were seen with the smokers, followed by pan chewing, pan masala, tobacco chewing, and betel nut chewing (Graph 3). This result was in relevance with the study conducted by Sheiham where he found that severity of periodontal disease was more in smokers than non-smokers. Summers and Oberman also concluded that one of the risk factors of periodontal disease is smoking, independent of age. Mehta et al. in his study relating betel nut chewing with periodontal disease also found that betel nut chewing was one of the detrimental factors in the periodontal disease. This habit causes more destruction on the posterior region, which is in accordance with the present study. In this study, angular defects were found to be more in the mandibular region than in the maxilla (52.38% vs. 47.62%, respectively) depicting no statistical significance (Graph 4). A possible explanation may be that the greater thickness of supporting alveolar bone in the mandible and the radius of the effect of bacterial plaque is suggested to be approximately 1.5-2 mm, bony plates thinner than 1.5-2 mm might be completely destroyed by bacterial plaque (horizontal bone resorption); in contrast, thicker bony plates will develop infrabony defects. It was also suggested an association between thickness of bone surrounding the roots and morphology of
bone resorption associated with periodontitis. This allows the formation of a greater number of infrabony defects.\textsuperscript{11} The angular defects most commonly recorded in posterior region were craters, which accounted for almost half of the defects followed by three-wall, two-wall, and one-wall defects, which were similar to the study conducted by Vrotsos \textit{et al.}\textsuperscript{3} The more number of craters seen posteriorly may be that the interdental area is difficult to clean and the cancellous bone is more reactive and has a rapid turnover than cortical bone. Furthermore, it is well known that the interproximal bone between the anterior teeth is pyramidal, whereas between molars it is flat buccolingually. In addition, because of specific arrangement of capillaries in the interproximal gingival region and the col, inflammation results in a midplane bone resorption, with buccal and lingual plates affected much less, because the buccolingual dimension is far greater than the mesiodistal dimension.\textsuperscript{3} The distribution of defects in the posterior sextants of the left and right side of maxilla and mandible showed no statistical significant result. While, there was a difference of distribution in the anterior and posterior sextants. Comparisons of angular defects in posterior and anterior segments showed that posterior mandibular segment had the slightly higher percentage of teeth with defects (20\%) followed by the posterior maxillary segment (19\%). The proportions of teeth with defect in the anterior segment of both the arches were similar. The higher percentage of bone defects in the posterior segments compared with anterior portions may be explained by the anatomical factors (Graph 5). The thin alveolar process, both in maxillary and mandibular anterior segments, leads to horizontal bone resorption and does not allow the formation of a large number of infrabony defects.

**CONCLUSION**

Chronic destructive periodontitis is the most common disease resulting in resorption of the bone supporting the teeth and leads to changes in the normal architecture of the alveolar processes. Periodontal bone loss from periodontitis may be either horizontal or vertical, leading to the formation of defects contained within the bone. An intrabony defect may be detected by radiographic means, bone sounding, or by visual examination of the bone defects during periodontal surgery or of dried skull. The disadvantage of radiographical examination is that it always shows 20-30\% less destruction than the original and lingual or buccal cortical plates cannot be seen due to high percentage of root to bone mineralization. In bone sounding, we can only judge the bone level by tactile sensation. Direct observation of bone during surgery is the only means to accurately record the bone morphology.\textsuperscript{4} Within the scope and limitations of the present study, it was concluded that prevalence and distribution of bone defect are multifactorial and were not related to one cause. It is related to the age, sex, SES, adverse habits, and the anatomy of the bone. Further studies may be required to know the standardized anatomy of the defect so the disease can be early identified and the proper treatment plan can be implemented.

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Video-based Clinical Anatomy Lectures for First Year Medical Students: A Novel Approach

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Abstract

Introduction: Lectures are the main mode of delivering a large amount of information to the undergraduate students till date. Traditional anatomy teaching tends to focus more on details rather than its clinical relevance.

Aims: The objective was to make students competent in applying and correlating the anatomical knowledge with the clinical conditions and to use videos as an adjunct to teaching clinical anatomy.

Settings and Design: This study was a prospective and randomized study.

Materials and Methods: For this, two clinical conditions in teaching of the abdomen were selected. A total of 150 first year medical students were divided into two groups by lottery. Group 1 - study group (SG, n = 75) and Group 2 - control group (CG, n = 75). A pretest was conducted for both groups. SG received two interactive video-based clinical anatomy lectures along with traditional gross anatomy lectures (TGL) and dissection. CG received only TGL along with dissection. A post-test in clinical anatomy was conducted for both groups.

Statistical Analysis: Independent “t”/Mann–Whitney test was used to compare the pre- and post-test scores within SG and the post-test scores between groups.

Results: There was a statistically significant (P < 0.001) difference in the mean post-test scores of the two groups and also in the pre- and post-test scores of SG students, which demonstrates that video-based clinical anatomy lectures are effective in enabling students to correlate anatomical with clinical information.

Conclusion: Interactive, video-based clinical anatomy lectures are effective in enabling students to correlate anatomical and clinical information.

Key words: Clinical anatomy, Lecture, Medical students, Video

INTRODUCTION

Anatomy is regarded as the cornerstone of medical education. A sound knowledge of anatomy is utmost vital for surgeons and also for other medical professionals for examination of a patient, diagnosis, for undertaking interventional procedures, and also for carrying out imaging techniques.¹ There are several challenges faced by the curriculum planners in anatomy education such as reduced teaching hours, technological advances, cost involved in the purchase of cadavers, need for interactive learning, integration with clinical subjects, and reduction in the number of teaching faculties. This has led to remodeling of the mode of instruction of the subject to the medical students.² Lectures are the main mode of delivering a large amount of information to the students till date. Traditional anatomy teaching tends to focus more on the details rather than its clinical relevance. There are several rewards of learning anatomy with clinical relevance and multimedia sources.³ The use of videos to teach anatomy stimulates student’s curiosity in learning the subject and also for clinical application of anatomical facts and helps in choosing surgery as a potential professional path.⁴
Hence, we hypothesized that a modified lecture format which will make students competent in applying and correlating anatomical knowledge with clinical conditions will be beneficial to the students. The objective of this study was to make students competent in applying and correlating the anatomical knowledge with the clinical conditions and to use videos of clinical conditions in lectures as an adjunct to teaching clinical anatomy. We therefore proposed to develop, implement, and evaluate video-based clinical anatomy lectures for first year medical students.

SUBJECTS AND METHODS

In this study, 150 first year MBBS students of 2014-2015 batch of Meenakshi Medical College Hospital and Research Institute, Enathur, Kancheepuram participated. This study was a prospective and randomized study (randomization by lottery method). Institutional ethical committee clearance was obtained. The details of the study were explained to the students, and a subject information sheet was given to them, and following this, informed consent was obtained from the participants.

150 first year MBBS students were divided into two groups of 75 each by lottery method. Group I was the study group (SG) and Group II was the control group (CG). The study was carried out during the gross anatomy teaching of the abdomen. Two clinical cases (inguinal hernia and hydrocele) were selected for the video-based clinical anatomy lectures. Model lesson plans, power point presentation, case study, pre-and post-test questionnaire, and a validated feedback questionnaire were prepared. Both the SG and CG students received the traditional gross anatomy lectures (TGL) and dissection on the gross anatomy of corresponding selected clinical cases, i.e., inguinal canal, male external genital organs. Both the group of students were given a pretest in clinical anatomy for each lecture. After this, the SG students received video-based clinical anatomy lectures (inguinal Hernia and hydrocele). These lectures were for 45 min each and were divided into multiple interactive segments. These lectures started with an introduction through a case study, followed by briefing of the relevant gross anatomy with questions, followed by clinical features of the selected clinical condition and a discussion on the given cases. A video demonstration of the case was shown with explanations at the end of the lecture followed by discussion. These lectures were made interactive by the use of clinical case study with discussion of the case, videos of the clinical case, buzz group, think, pair, and share, in which students were given a task to complete by pairing with the student next to him/her and finally share the answers with the large group. When SG students were exposed to the new teaching method, the CG students were given revision of the corresponding topic in dissection hall. A post-test in clinical anatomy was given to both the groups for each lecture. A feedback questionnaire was given to the SG students to get their responses on the new teaching method.

The pre- and post-test scores for both the groups for each lecture were tabulated and were statistically analyzed.

Statistical Analysis

Independent –“t”/Mann–Whitney test was used to compare the pre- and post-test scores within SG and the post-test scores between groups.

RESULTS

Following are the results of this study:

1. Comparison of post-test scores between groups - independent –“t”/Mann–Whitney test.

When the post-test scores of the study and CGs for each lecture were analyzed using independent t-test/Mann–Whitney test (Table 1), it showed that there is a significant difference between SG and CG students for both the lectures with a $P < 0.001$ which is statistically significant. This shows that SG students performed better than CG students when post-test scores of both were compared.

2. Comparison of pre- and post-test scores within SG - independent –“t”/Mann–Whitney test.

When the pre- and post-test scores of the SG for each lecture were analyzed using independent t-test/Mann–Whitney test (Table 2), it showed that there is a significant difference between the pre- and post-test scores of SG students for both the lectures with a $P < 0.001$ which is statistically significant. This shows that SG students performed better in the post-test compared to pretest.

### Table 1: Comparison of post-test scores between groups - independent –“t”/Mann–Whitney test

<table>
<thead>
<tr>
<th></th>
<th>Post-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td></td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>6.04±2.84</td>
<td>3.62±1.79</td>
</tr>
<tr>
<td>Hydrocele</td>
<td>3.43±1.04</td>
<td>1.24±0.78</td>
</tr>
</tbody>
</table>

SG: Study group, CG: Control group, SD: Standard deviation

### Table 2: Comparison of pre- and post-test scores within SG - independent –“t”/Mann–Whitney test

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Post-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean±SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>2.88±1.54</td>
<td>6.04±2.84</td>
<td>0.000</td>
</tr>
<tr>
<td>Hydrocele</td>
<td>0.92±0.67</td>
<td>3.43±1.04</td>
<td>0.000</td>
</tr>
</tbody>
</table>

SG: Study group, SD: Standard deviation
3. Analysis of feedback questionnaire.
   From Figure 1, it is evident that 95% of students have agreed, strongly agreed, or very strongly agreed to the feedback items 1-6.

Following were the open-ended questions and responses of the SG students for the feedback questionnaire.

Question 1 focuses on the process of lecture (interactive), question 2 focuses on the content of the lecture, and question 3 on the use of videos in lectures.

1. List the effects of traditional lecture method and the new teaching method on your learning.

The responses of students on the effects of traditional lecture method and the new teaching method on their learning are:
Students responded that the TGL are monotonous and vague, there were no opportunities to interact and were difficult to understand. On the other hand, the new teaching method (interactive lectures) was more interesting, thought provoking, and made them more attentive, and there were opportunities to interact.

From the above responses, it is clear that SG students found the new teaching method (interactive lectures) more interesting, interactive, and thought provoking as compared to the TGL.

2. List the ways in which the traditional lecture and the new teaching method affected your understanding of the clinical conditions.

The responses of students on the ways in which the traditional lecture and the new teaching method affected the student's understanding of the clinical conditions are as follows.
Students responded the TGL do not emphasize on the importance of clinical anatomy, clinical anatomy is explained only superficially, and it was difficult to apply anatomy concepts. On the other hand, the new teaching method (clinical anatomy lectures) gave a clear understanding of the clinical condition, more emphasis was given to clinical anatomy, and they felt that they are able to correlate anatomical knowledge with the given clinical condition.

From the above, it is clear that SG students found the new teaching method (clinical anatomy lectures) helped them understand and correlate anatomical knowledge with the given clinical condition as compared to the TGL.

3. Do you think the use of video in lectures helped you learn better? If yes, how? If No, why?

The responses of students are that the use of videos of clinical cases was very helpful in understanding anatomy, made them learn not only anatomy better but also the clinical application of anatomy in a better way. They also felt that visual learning is thought provoking and the knowledge gained on the clinical cases will be very helpful in for clinical years.

DISCUSSION

This study showed that a video-based clinical anatomy lectures, which was also interactive, were beneficial to the students as are evident from the higher post-test scores of SG students as compared to CG students who were only exposed to TGL. TGL tends to focus more on minute anatomical details, thus giving less emphasis on the clinical correlation of the topic under the study. Students when exposed to clinical anatomy lectures in an interactive way complemented with relevant videos, showed more interest, are motivated, and learn better as seen from the feedback obtained from students.

The Medical Council of India in its vision 2015 insists on early clinical exposure in the first year of medical school itself. This study is in accordance with the guidelines laid by MCI in this aspect as we have introduced clinical cases in the first year itself by making use of a paper case and video.

Drake introduced an innovative clinically oriented approach to anatomy teaching which involved three steps. In the first step, students previewed a clinical case, and in the next step, students gained basic anatomical knowledge about the case using textbooks and self-directed learning. In the last step, presentation and discussion of the clinical case were done by a clinician. In this study, we have used a lecture format for a large group of students by the introduction of a clinical case, reinforcement of anatomical knowledge, and discussion of the clinical case along with supplementation of a video demonstration on the clinical condition.

Clinical association lectures have been implemented, in which clinicians were asked to give a lecture, and when they helped students with problem-based case studies, it was
seen that when the clinician stresses the clinical relevance, the interest of the students was very high.\(^6\)

As quoted by Gülpinar and Yegen that students who are engaged in active learning learn better than passive learners, a well-structured lecture can be thought provoking and can motivate students to learn leading to increase in critical thinking skills of the students.\(^7\) In this study, we have implemented a well-structured clinical anatomy lectures which were divided into multiple interactive segments.

As quoted by El-Sayed \textit{et al.}, video-based lectures are a good source for making students center their attention on the required details.\(^8\)

Nikopoulou-Smyrni and Nikopoulos, in their studies, have opined that the use of short videos in lectures to teach have constructive force on student's motivation and concentration.\(^9\)

Alnassar \textit{et al.} concluded that the use of videos in gross anatomy teaching increases the students' interest in learning the subject and also helps them to apply anatomical concepts. They propose that this can be adjuvant to the traditional teaching and cannot replace the cadaver dissection.\(^4\) Our study is in line with this study that video-based clinical anatomy lectures can be made supplement to the TGL teaching methods such as dissection, prossection, and TGL.

Integration of basic sciences with clinical medicine is very important in developing physicians who have clinically correlated facts and making them medical experts.\(^10\)

Since lectures have a major role in teaching of anatomy to medical students, they cannot be replaced. Hence, the author suggests that the routine gross anatomy lectures can be supplemented with videos, clinically relevant anatomy, and can be made more interactive so that students are motivated to learn anatomy and will be able to apply anatomical concepts when dealing with clinical cases in their clinical years.

**CONCLUSION**

Hence, the authors conclude that interactive, video-based clinical anatomy lectures are effective in enabling students to correlate anatomical and clinical information, as well as being acceptable as a better method of teaching and learning.

**REFERENCES**

Role of Ultrasonography in Evaluation of Rotator Cuff in Patients of Chronic Shoulder Pain in Comparison to Magnetic Resonance Imaging

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Abstract

Introduction: Shoulder pain is one of the most common complaints encountered in orthopedic practice, and approximately 1% of adults consult a general practitioner with new shoulder pain annually.

Aims and Objectives: To evaluate the accuracy of ultrasonography (USG) in comparison to magnetic resonance imaging (MRI) in assessing rotator cuff pathology in terms of sensitivity and specificity.

Materials and Methods: Our study is observational, prospective study with cross-sectional data collection done in a period of September 2015 to September 2016. 51 patients with chronic shoulder pain and those who fulfilled our inclusion criteria were selected as the study population. USG was done to assess rotator cuff followed by MRI.

Result: In our study for assessing partial tendon tear USG was 92.9% sensitive, 86% specific, had 72% positive predictive value (PPV), 97% negative predictive value (NPV), and 88% accuracy in comparison to MRI. For assessing complete tendon tear USG showed 100% sensitivity, 97% specificity, 90% PPV, 100% NPV, and 98% accuracy.

Conclusion: Ultrasound proved to be highly accurate in evaluating partial tendon tear and complete tear. Thus, USG can be used as primary screening modality while assessing rotator cuff pathology.

Key words: High resolution ultrasonography, Magnetic resonance imaging, Rotator cuff pathology

INTRODUCTION

Shoulder pain is one of the most common complaints encountered in orthopedic practice and approximately 1% of adults consult a general practitioner with new shoulder pain annually. Magnetic resonance imaging (MRI) is an excellent modality because of its multiplanar capability and is reliable technique for the evaluation of rotator cuff tendon, however, because of low availability and considering cost factor ultrasonography (USG) can be used as screening modality. It has gained its place in literature along with MRI. Cost effectiveness and ready availability are its biggest advantages in several clinical settings. The real-time capability of ultrasound in conducting dynamic studies in areas like shoulder is a very big asset. It helps to do quick comparison with the contralateral side, which is of great help in many difficult situations.

MATERIALS AND METHODS

Our study is observational (diagnostic analytical), prospective study with cross-sectional data collection in a period of September 2015 to September 2016 done at the Department of Radiodiagnosis, Pt. Jawahar Lal Nehru Memorial Medical College, Raipur, Chhattisgarh, India.

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After obtaining approval from Ethics Committee, we prospectively searched for patients having chronic shoulder pain of more than 3 months. USG followed by MRI was done in our department.

The inclusion criteria of the study were, patients having chronic shoulder pain, suspected to be arising from the musculotendinous tissues around the glenohumeral joint or features suggestive of rotator cuff tear on physical examination such as Drop Arm sign and external rotation lag sign.

The exclusion criteria of the study were patient having arthritis of joint, any previous surgical intervention, having contraindication to MR evaluation such as patient with pacemaker, claustrophobia, and metallic implants.

We included a total of 51 patient of chronic shoulder pain. The mean interval between sonography and MRI was 10 days (range, 5-15 days).

USG assessment of rotator cuff was by experienced radiologist using Toshiba Aplio MX ultrasound machine having high frequency small part probe. We assessed following factors in each patient: Status of subscapularis, supraspinatus, infraspinatus and teres minor tendon, fluid in subdeltoid and subcoracoid bursa (SCB), assessment of biceps tendon, fluid in biceps tendon sheath (BTS), and acromioclavicular joint (ACJ). Acromiohumeral distance was assessed. Comparison with contralateral side was done. Dynamic evaluation for shoulder impingement was done.

MRI of these patients was performed on MAGNETOM Skyra, Siemens, Germany and accessories including pelvic phased-array coil 3T field strength. 70 cm open bore design, 173 cm system length, approximately 35 m² room size. RF Tim (204 × 48) (204 × 64) (204 × 128), Gradient strength – XQ Gradients (45 mT/m @ 200 T/m/s). Zero Helium boil-off technology pressure injector.

The following sequences were performed: Proton density weighted images with fat saturation in the axial, coronal oblique and sagittal oblique plane with a slice thickness of 3 mm, a field of view (FOV) of 180 mm and TR/TE – 4300/40, voxel size 0.5 mm × 0.5 mm × 3 mm. T2 weighted images in the oblique coronal plane with a slice thickness of 3 mm, FOV of 180 mm and TR/TE – 3100/76. Short T1 inversion recovery images in the coronal plane with a slice thickness of 3 mm, a FOV of 180 mm, and TR/TE – 3630/52. T1 weighted image in sagittal and coronal plane with slice thickness of 3 mm, a FOV of 180 mm and TR/TE – 600/10.

Similarly, another two experienced MRI–trained radiologists examined the images. The examiners were blinded to the USG findings.

**Statistical Evaluation**

The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy for assessment of partial and complete tendon tear using USG in comparison to MRI was calculated using two by two contingency tables. Chi-square/Fisher exact test has been used to find the significance of study parameters on categorical scale between two and more groups.

**RESULTS**

There were total - 51 cases of chronic shoulder pain on whom USG followed by MRI was done in the Department of Radiodiagnosis, Pt. Jawahar Lal Nehru Memorial Medical College.

On USG supraspinatus tendon was the most common tendon to be involved in our study. 31 patients were detected with supraspinatus tendon pathologies (Table 1). Out of 31 patients of supraspinatus involvement – 17 patients had partial tendon tear among which 10 patients had articular surface tendon tear, 6 patients had bursal surface tear, and 1 patient had intrasubstance tear. 10 had complete tear of supraspinatus tendon. 4 patients had supraspinatus tendinosis. 1 patient was detected to have partial subscapularis muscle tear. 1 had complete tear of biceps.

A total of 23 patients were detected to have fluid in subacromial-subdeltoid bursa (SADB) fluid. Out of which 9 had complete tear, 12 had partial tear, and 2 had tendinosis. 38 patients had fluid in BTS on USG. In 38 patients detected have fluid in BTS, 10 patients had complete tendon tear of supraspinatus, 15 patients had partial tendon tear of supraspinatus, 4 patients had supraspinatus tendinosis, 1 patient had partial tendon tear of subscapularis, and 8 patients were reported as normal. 5 patients had ACJ hypertrophy on USG. In 5 patients detected to have ACJ hypertrophy on USG, all had complete tendon tear of supraspinatus. 15 patients had fluid in SCB fluid on USG. In 10 patients detected to have fluid in SCB on USG, 7 patients had complete tendon tear of supraspinatus, 6 patients were detected to have partial tendon tear of supraspinatus, 1 patient had partial tendon tear of subscapularis, and 1 patient had supraspinatus tendinosis.

On MRI also, supraspinatus tendon was the most common tendon to be involved in our study. 37 patients were detected with supraspinatus tendon pathologies (Table 2). Out of 37 patients detected to have supraspinatus pathologies – 13 had partial tendon tear in which 10 patients had articular surface partial tendon tear and 3 patients had bursal surface...
tendon tear. 9 patients had complete tendon tear and 13 patients had tendinosis. 1 patient was detected to have partial subscapularis muscle tear with reduced coracohumeral distance. 1 had complete tendon tear of biceps.

A total of 24 patients had fluid in SADB. Out of 24 patients who were detected to have fluid in SADB detected on MRI, 9 patients had complete tendon tear, 11 patients had partial tendon tear, and 5 patients had tendinosis/teninditis. 40 patients had BTS on MRI. In 40 patients detected to have BTS fluid on MRI, 8 patients had complete tendon tear of supraspinatus, 12 patients had partial tendon tear of supraspinatus, 14 patients had supraspinatus tendinosis, 1 patient had partial tendon tear of subscapularis, and 5 patients were reported as normal.

A total of 36 patients had ACJ hypertrophy on MRI. In 36 patients who were detected to have ACJ hypertrophy on MRI, 6 patients had complete tendon tear of supraspinatus, 10 patients had partial tendon tear of supraspinatus, 12 patients had supraspinatus tendinosis, 1 had partial tendon tear of supraspinatus, and 7 patients were reported as normal. 23 patients had fluid in SCB fluid on MRI. Out of 23 patients having fluid in SCB on MRI, 9 patients had complete tendon tear of supraspinatus, 10 patients had partial tendon tear of supraspinatus, 3 patients had supraspinatus tendinosis, 1 had partial tendon tear of supraspinatus, and 1 was reported as normal.

On MRI 1 patient had labral injury with Hill-Sachs deformity. 1 patient had signal intensity changes in the form of hyperintensity in SGHL. Type II acromion was the most common acromion in our study (85%). 4 patients had inferolateral tilt of acromion.

DISCUSSION

Our study shows among 51 patients, the most common age group of patients presenting with a rotator cuff injury was in the 41-50 years range constituting 46% of the cases with the mean age of 44.5 years. Males were the majority of the patients constituting around 60% of the cases. Majority (63%) patients in our study had right hand dominance. These results are in concordance with the observations seen by Urwin et al. who proposed that rotator cuff tears tend to prevail in the dominant arm.

Supraspinatus tendon was the most common tendon involved in our study. On USG 31 patients and on MRI 37 patients had supraspinatus pathology. This is comparable to research study by Vijayvargiya et al., Saraya and El Bakry, Khanduri et al., and Burbank et al. The supraspinatus muscle is vulnerable to tearing due to its anatomic position and the biomechanics of the shoulder complex.

In our study out of 51 cases, 13 patients were detected to have partial tendon tear of supraspinatus and 1 patient had partial tendon tear of subscapularis on MRI whereas USG demonstrated partial tendon tear of supraspinatus in 17 patients and partial tendon tear of subscapularis in 1 patient. On USG there were 4 false positive cases probably due to anisotropy related artifacts. Thus, ultrasound was 92.9% sensitive, 86% specific had 72% PPV, 97% NPV and was 88% accurate in diagnosing partial tendon tear which correlated well with studies by Vijayvargiya et al., Saraya and El Bakry, Khanduri et al., and Bhatnagar et al. (Table 3).

In our study among the 13 partial tendon tear of supraspinatus, 10 had articular surface tendon tear whereas 3 had bursal surface tendon tear. This shows articular surface tear were more common than bursa surface tear. Similar result was observed by Khanduri et al., Vlychou et al., and Modi et al. and partial tendon tear of subscapularis was found in only 1 case results correlated with study conducted by Codman et al. who found subscapularis involvement was 3.5% in rotator cuff pathologies. In our study, partial tendon tear of subscapularis was associated with subcoracoid impingement and had reduced coracohumeral distance of 7 mm (Figures 1 and 2).
A total of 10 patients were detected to have complete tendon tear on USG whereas 9 patients were confirmed to have complete tendon tear on MRI. 1 patient who was over diagnosed as complete tendon tear on USG had Grade 3 partial tendon tear of supraspinatus. Thus, USG was 100% sensitive, 97% specific, had 90% PPV, 100% NPV, and was 98% accurate in diagnosing complete tendon tear which correlated well with studies by Vijayvargiya et al.,13 Saraya and El Bakry,14 Khanduri et al.15 Lenza et al.,11 and Bhatnagar et al.12 (Table 3 and Figures 3; 4).

A total of 13 patients were detected as having supraspinatus tendinosis on MRI whereas only 4 patients were detected to have supraspinatus tendinosis on USG. This showed USG had 30% sensitivity, 100% specificity and 100% PPV, 80.9% NPV, and 82.35% accuracy in diagnosing tendinosis (Table 3 and Figure 5).

A total of 23 patients had fluid in SADB on USG whereas 24 were confirmed to have fluid in SADB on MRI. This showed USG had 95.83% sensitivity, 100% specificity and 100% PPV, 96.43% NPV, and 98% accuracy in detecting SADB fluid in comparison to MRI which correlated well with studies conducted by Vijayvargiya et al.13 and Shrestha and Alam9 (Table 3).

Out of 24 cases of fluid in SCB detected on MRI only 10 were detected on USG. Thus, USG showed 41% sensitivity, 100% specificity, 100% PPV, 65.8% NPV, and 72.5% accuracy in assessing SCB fluid (Table 3).

Out of 37 cases of ACJ hypertrophy detected on MRI, only 5 were detected on USG. Thus, USG had 13% sensitivity, 100% specificity, 100% PPV, 32% NPV, and 39% accuracy in assessing ACJ hypertrophy which correlates with study conducted by Vijayvargiya et al.13 and shows MRI is more sensitive for detection of ACJ hypertrophy (Table 3).

Out of 40 patients who were detected to have fluid in BTS on MRI, 38 patients were correctly detected to have fluid in BTS on USG. This showed USG had 90% sensitivity, 81% specificity and 94% PPV, 69% NPV, and

**Table 3: Comparison between ultrasonography and MRI in assessment of rotator cuff pathology**

<table>
<thead>
<tr>
<th>Type of lesion</th>
<th>USG</th>
<th>MRI</th>
<th>Sensitivity %</th>
<th>Specificity %</th>
<th>PPV %</th>
<th>NPV %</th>
<th>Accuracy %</th>
</tr>
</thead>
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<tr>
<td>Complete tendon tear</td>
<td>10</td>
<td>9</td>
<td>100</td>
<td>97.6</td>
<td>90</td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td>Partial tendon tear</td>
<td>18</td>
<td>14</td>
<td>92.9</td>
<td>86.5</td>
<td>72.2</td>
<td>97</td>
<td>88</td>
</tr>
<tr>
<td>Tendinosis</td>
<td>4</td>
<td>13</td>
<td>30.8</td>
<td>100</td>
<td>100</td>
<td>80.9</td>
<td>82.35</td>
</tr>
<tr>
<td>Subacromial SCB fluid</td>
<td>23</td>
<td>24</td>
<td>95.83</td>
<td>100</td>
<td>100</td>
<td>96.43</td>
<td>98</td>
</tr>
<tr>
<td>SCB fluid</td>
<td>10</td>
<td>24</td>
<td>90</td>
<td>100</td>
<td>100</td>
<td>65.8</td>
<td>72.5</td>
</tr>
<tr>
<td>BTS</td>
<td>38</td>
<td>40</td>
<td>9.8</td>
<td>94.7</td>
<td>70</td>
<td>88</td>
<td>99</td>
</tr>
<tr>
<td>ACJ hypertrophy</td>
<td>5</td>
<td>31</td>
<td>13</td>
<td>100</td>
<td>100</td>
<td>32</td>
<td>39</td>
</tr>
</tbody>
</table>

USG: Ultrasonography, MRI: Magnetic resonance imaging, PPV: Positive predictive value, NPV: Negative predictive value, BTS: Biceps tendon sheath, SCB: Subcoracoid bursa, and ACJ: Acromioclavicular joint

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**Figure 1:** (a) Ultrasonography – articular surface partial tendon tear of supraspinatus tendon at 1 cm proximal to greater tuberosity, (b) magnetic resonance imaging proton density weighted coronal oblique image – Grade 1 articular surface tendon tear 1 cm proximal to greater tuberosity

**Figure 2:** (a) On ultrasonography thinned out supraspinatus tendon (red arrow) with reduced acromiohumeral distance and minimal fluid in subdeltoid bursa (blue arrow), (b) magnetic resonance imaging proton density weighted coronal oblique image with fat saturation - supraspinatus tendon tear with few spared fibers and reduced acromiohumeral distance with minimal subdeltoid fluid (blue arrow)

**Figure 3:** Complete tear of supraspinatus tendon at its attachment site with subdeltoid bursa fluid in lateral dependent region. (a) On ultrasonography and (b) on magnetic resonance imaging – proton density weighted coronal image with fat sat
88% accuracy in detecting bicep tendon sheath fluid. Our study showed that USG was sensitive in detecting fluid in BTS which does not correlate with studies conducted by Vijayvargiya et al. and Hollister et al. according to which MRI is more sensitive in detecting fluid in BTS (Table 3).

Among 42 patients having Type II acromion, 5 patients had complete tendon tear of supraspinatus, 13 patients had partial tendon tear of supraspinatus, 10 patients had supraspinatus tendinosis, and 14 were reported as normal (Table 3).

In 4 patients having Type I acromion, 1 patient had complete tendon tear of supraspinatus, 1 patient had supraspinatus tendon tear, 1 patient had partial tendon tear of subscapularis, and 1 patient was reported as normal.

In 5 patients having Type III acromion, 2 patients had complete tendon tear of supraspinatus, 2 patients had supraspinatus tendinosis, and 1 patient had partial tendon tear of supraspinatus.

Few studies have also shown correlation between acromion tilt and rotator cuff pathology. According to Banas et al. it was the inferolateral acromion process which was associated with rotator cuff pathology, but in our study, 4 patients had inferolateral tilt of acromion out of which only 1 patient had complete tear, 1 patient had tendinosis, and 2 were normal, so no significance correlation was seen between lower acromion tilt and rotator cuff tear in our study.

**CONCLUSION**

In our study, USG proved to be highly accurate in evaluating partial tendon tear and complete tear. Thus, USG is almost equally effective as MRI for rotator cuff tears but not for other pathologies. Because of high resolution and better soft tissue assessment, MRI should be used to evaluate overall joint including labral, capsular or ligamentous pathologies before planning any surgery. Hence, USG can be used as a first line of investigating a case of shoulder joint pain to rule out rotator cuff pathologies, but MRI is the gold standard in the evaluation of rotator cuff pathologies because MRI is the most sensitive and specific modality for the establishment of shoulder pain.

**Case 1:** Patient came with chief complain of pain since 3 months (articular surface partial tendon tear)

**Case 2:** Patients came with chief complaint of pain and restriction of movement since 5 months (Grade 3 partial tear with few spared fibers of supraspinatus)

**Case 3:** (complete tear)

Clinical profile – patient came with chief complain of pain since 5 months with restriction of motion.

**Case 4:** (complete tear of supraspinatus)

The patient came with chief complaint of restriction of movements of the right shoulder with pain on overhead movements like combing.

**Case 5:** Patient came with chief complaint of pain since 3 months
REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Clinicopathological Study of Ovarian Tumors: A 2-year Study

Vaddadi Manoja¹, M Pramood¹, Vaddadi Jyothi², K P A Chandrashekar³

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Abstract

Introduction: The ovarian tumors manifest a wide spectrum of clinical, morphological, and histological features. Their complex nature, unpredictable behavior, and prognosis and varying therapeutic strategies necessitate an accurate diagnosis.

Aims and Objectives: The aim is to study the incidence, age-related occurrence, clinical presentation, gross and various histopathological patterns of ovarian tumors and also to classify them according to World Health Organization (WHO) classification in our institute.

Materials and Methods: This retrospective study included 120 cases of histopathologically proven ovarian tumors, reported in the Department of Pathology, Narayana Medical College, Nellore over a 2 year period (June 2011 to May 2013). These were classified according to the WHO classification of ovarian tumors (2003).

Results: Of the 120 tumors studied, 108 (90%) were benign and 12 (10%) were malignant. Surface epithelial tumors were the most common (84.2%) followed by germ cell tumors (10%). Serous cystadenomas (56.67%) were the most common benign tumors, whereas serous cystadenocarcinomas (25%) were the most common malignant tumors. Benign tumors peaked between 31 and 40 years, whereas malignant tumors were common after 50 years. Mass abdomen and pain abdomen were the common modes of presentation.

Conclusions: Ovarian tumors are quite common in our setup and epithelial tumors are the most common variety of ovarian tumors. The histological type of ovarian tumor correlates with the prognosis of the tumor.

Key words: Germ cell tumors histological type, Ovarian tumors, Surface epithelial tumors

INTRODUCTION

The ovary is complex in its embryology, histology, and steroidogenesis and has the potential to develop malignancy. Therefore, ovarian neoplasms exhibit a wide variation in structure and biological behavior.¹

Ovarian cancer accounts for about 3% of all cancers in women. Ovarian tumors represent about 27% of all female genital cancers and account for 52% of deaths caused by female genital cancers.³ This high mortality is attributed to lack of symptoms in most patients with early stage of disease. In approximately 70% of the patients, the tumor has spread outside of pelvis at the time of presentation.³ Unfortunately, patients with ovarian tumors are often symptom-free for a long time and the signs are often nonspecific. By the time, ovarian malignancy is established, about two-thirds of these are already advanced, and the prognosis is poor.¹

Most ovarian tumors cannot be confidently distinguished from one another on the basis of their clinical or gross characteristics alone. These features provide important diagnostic clue in some cases; however, in such cases, both clinician and the pathologist should share their possibly valuable information in establishing correct diagnosis.³

The complex nature and unpredictable behavior and prognosis, controversial management make the ovarian tumors a difficult problem for gynecologist. The histogenesis of many tumors is interrelated and accurate
Aims and Objectives
The objectives of the present study are:
1. To classify the ovarian neoplasms as per the World Health Organization (WHO) classification,
2. To study the histological subtypes of ovarian neoplasms,
3. To study the distribution of ovarian neoplasms,
4. To study the age distributions of various tumors,
5. To correlate histopathology with clinical findings.

Materials and Methods
In our retrospective study, 120 cases of ovarian tumors were studied from June 2011 to May 2013 in the Department of Pathology, Narayana Medical College and Hospital, Nellore, India. All the materials such as blocks and slides available in the department were studied.

The data were collected on a pro forma, which consists of the relevant information about age, clinical presentation, size of tumor, bilaterality, provisional diagnosis, operative findings, and histopathological analysis.

Specimens without the complete information were excluded from the study. The slides were stained with hematoxylin and cosin (H and E) stain and reviewed. In addition to H AND E, special stains, periodic acid-Schiff and reticulin stains, were done whenever necessary.

Results
In the present study, 120 cases of ovarian neoplasms were studied during 2 years from June 2011 to May 2013.

Frequency of Benign and Malignant Tumors of Ovary
Out of 120 neoplastic lesions, 108 cases were benign comprising 90% and 12 cases were malignant accounting for 10% (Table 1).

Laterality of Ovarian Tumors
In the present study, majority of the benign tumors (100 cases) were unilateral accounting for 92.6% and only 8 cases (7.4%) had bilateral tumors. Among the malignant tumors, 9 cases had unilateral tumors accounting for 75% and 3 cases (25%) had bilateral tumors (Table 4).

Size Ranges of Ovarian Neoplasms
In the present study, most of the tumors (55 cases) were in 5-9 cm size range accounting for 45.8%, followed by 10-19 cm size range (30 cases; 25%). Most of the tumors in 5-9 cm size range were benign in nature. Most of the

<table>
<thead>
<tr>
<th>Table 1: Frequency of benign and malignant tumors of ovary</th>
</tr>
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<tbody>
<tr>
<td>Type of neoplasm</td>
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<tr>
<td>------------------</td>
</tr>
<tr>
<td>Benign</td>
</tr>
<tr>
<td>Malignant</td>
</tr>
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<table>
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<tr>
<th>Table 2: The clinical presentation of the patients with ovarian tumor</th>
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<tbody>
<tr>
<td>Clinical features</td>
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<td>-------------------</td>
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<tr>
<td>Mass per abdomen</td>
</tr>
<tr>
<td>Pain abdomen</td>
</tr>
<tr>
<td>GI disturbances</td>
</tr>
<tr>
<td>Loss of weight/loss of appetite</td>
</tr>
<tr>
<td>Ascites</td>
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<tr>
<td>Menstrual abnormality</td>
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<tr>
<td>Infertility</td>
</tr>
<tr>
<td>Total</td>
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<tr>
<th>Table 3: Distribution of tumors in the different age groups</th>
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<tbody>
<tr>
<td>Age group (years)</td>
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</tr>
<tr>
<td>1-10</td>
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<td>11-20</td>
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<td>21-30</td>
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<td>31-40</td>
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<td>41-50</td>
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<tr>
<td>51-60</td>
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<tr>
<td>61-70</td>
</tr>
<tr>
<td>71-80</td>
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<tr>
<td>Total</td>
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<table>
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<tr>
<th>Table 4: Laterality of ovarian tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laterality</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Unilateral</td>
</tr>
<tr>
<td>Bilateral</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
large tumors (>20 cm) were malignant accounting for 5% (6 cases) (Table 5).

**Cut Section of Ovarian Neoplasms**

In the present study, majority of ovarian neoplasms (86 cases; 71.7%) showed cystic areas on cut section, of which most of them were benign (85 cases; 98.8%). Among the malignant tumors, most of the tumors (7 cases, 58.3%) showed solid and cystic areas (Table 6).

**Histological Types of Ovarian Neoplasms**

Surface epithelial tumors accounted for 84.2% (101 cases) and formed the major group of ovarian tumors, followed by germ cell tumors (12 cases; 10%) and sex cord-stromal tumors (5 cases; 4.2%). One case showed secondary deposits (0.8%) and one case was an undifferentiated tumor (0.8%) (Table 7).

**DISCUSSION**

Ovarian tumors manifest a wide spectrum of clinical morphological and histological features. Cancers of the ovary rank second, next to malignancies of cervix among female genital tract. They have become increasingly important not only because of large variety of neoplastic entities but also because of increased mortality rates.

In the present study, 120 ovarian neoplasms were recorded during the study (June 2011-May 2013). The retrospective study with regards to ovarian neoplasms was done in a detailed manner. Clinical and pathological findings of these tumors were analyzed and correlated with different studies. According to the studies, the frequency of benign lesions was more when compared to malignant lesions of the ovary. Our observations were very much similar.

**Frequency of Benign and Malignant Tumors of Ovary**

In the present study, 108 cases (90%) were benign and 12 cases (10%) were malignant. This is similar to the studies conducted by Gupta et al., Jha and Karki, Kuladeepa et al.,

![Table 5: Size ranges of ovarian neoplasms](image)

<table>
<thead>
<tr>
<th>Size (cm)</th>
<th>n (%)</th>
</tr>
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<tbody>
<tr>
<td>&lt;4</td>
<td>29 (24)</td>
</tr>
<tr>
<td>5-9</td>
<td>55 (45.8)</td>
</tr>
<tr>
<td>10-19</td>
<td>30 (25)</td>
</tr>
<tr>
<td>&gt;20</td>
<td>6 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>120 (100)</td>
</tr>
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</table>

![Table 6: Cut section of ovarian neoplasms](image)

<table>
<thead>
<tr>
<th>Type of neoplasm</th>
<th>Cystic</th>
<th>Solid</th>
<th>Cystic+solid</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>85 (78.7)</td>
<td>1 (0.9)</td>
<td>22 (20.4)</td>
<td>108</td>
</tr>
<tr>
<td>Malignant</td>
<td>1 (8.3)</td>
<td>4 (33.3)</td>
<td>7 (58.4)</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>5</td>
<td>29</td>
<td>120</td>
</tr>
</tbody>
</table>

WHO: World Health Organization
and Shoail et al., showing that the frequency of benign ovarian tumors was more compared to that of borderline and malignant (Table 9).

Comparison of Clinical Presentations in Benign Ovarian Neoplasms
In the present study, most of the patients with benign ovarian neoplasms presented with mass per abdomen (42.6%), followed by pain abdomen in 38.9% of cases. This observation was very much similar to the studies conducted by Kuladeepa et al. In the study done by Yasmin et al., pain abdomen was the most common symptom (Table 10).

Comparison of Clinical Presentations in Malignant Ovarian Neoplasms
Studies conducted by Randhawa and Lata and Goff et al. (2000) showed mass per abdomen (25%) and pain abdomen (25%) as the most common symptom, similar to our study (Table 11).

<table>
<thead>
<tr>
<th>Table 9: Frequency of benign and malignant tumors of ovary</th>
</tr>
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<tbody>
<tr>
<td>Study</td>
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<tr>
<td>-------</td>
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<tr>
<td>Gupta et al.</td>
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<tr>
<td>Jha and Karki</td>
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<tr>
<td>Kuladeepa et al.</td>
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<tr>
<td>From Shoail et al.</td>
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<tr>
<td>Present study</td>
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<table>
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<tr>
<th>Table 10: Comparison of clinical presentations in benign ovarian neoplasms</th>
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<tbody>
<tr>
<td>Symptoms</td>
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</tr>
<tr>
<td>Mass per abdomen</td>
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<tr>
<td>Pain abdomen</td>
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<tr>
<td>Menstrual irregularity/post-menopausal bleeding</td>
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<tr>
<td>Ascites</td>
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<tr>
<td>GI disturbances</td>
</tr>
<tr>
<td>Urinary symptoms</td>
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<tr>
<td>Infertility</td>
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<tr>
<td>Loss of appetite/loss of weight</td>
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<table>
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<tr>
<th>Table 11: Comparison of clinical presentations in malignant ovarian neoplasms</th>
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<tbody>
<tr>
<td>Symptoms</td>
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<tr>
<td>Mass per abdomen</td>
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<td>Pain abdomen</td>
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<table>
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<tr>
<th>Table 12: Distribution of ovarian tumors in different age groups</th>
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<tr>
<td>Age in years</td>
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<td>1-10</td>
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<td>61-70</td>
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<tr>
<td>&gt;70</td>
</tr>
<tr>
<td>Total</td>
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</table>
Distribution of Ovarian Tumors in Different Age Groups
Our present study was similar to the studies conducted by Jagadeeshwari et al. (1990)\textsuperscript{13} and Verma and Bhatia,\textsuperscript{14} in which the frequency of ovarian tumors was more in the age group 31-40 years and Ameena Ashraf et al. (2012)\textsuperscript{15} showed 21-30 years (Table 12).

Laterality of Benign Ovarian Tumors
The observation was very much similar to the studies conducted by Pilli et al.,\textsuperscript{16} Jha and Karki,\textsuperscript{7} and Kuladeepa et al.\textsuperscript{8} showing most of the benign tumors were unilateral, of which most of them were surface epithelial tumors and germ cell tumors (Table 13).

Laterality of Malignant Ovarian Tumors
Our observations were very much similar to the studies conducted by Prabhakar and Maingi,\textsuperscript{17} Misra et al.,\textsuperscript{18} Couto et al.,\textsuperscript{19} and Kuladeepa et al.\textsuperscript{19} showing that most of the malignant tumors are unilateral (Table 14).

Comparison of Size Ranges
Our study was similar to the study conducted by Okugawa et al.,\textsuperscript{20} which had the mean size of 4-9 cm (Table 15).

Frequency of Histological Types of Ovarian Neoplasms
Our study was similar to Ramachandran et al.,\textsuperscript{21} Verma and Bhatia,\textsuperscript{14} Swamy and Satyanarayana,\textsuperscript{22} and Mondal et al. and Ashraf et al.,\textsuperscript{15} in which surface epithelial tumors were the most common, followed by germ cell tumors (Table 16).

Frequency of Different Classes of Benign and Malignant Ovarian Tumors
Our study was similar to that of Jha and Karki.\textsuperscript{7} Surface epithelial tumors had a higher incidence in both benign and malignant ovarian tumors (Table 17).

CONCLUSION
The ovarian tumors manifest a complex wide spectrum of clinical and pathological features. Correlation of age, clinical features, gross, various histological patterns, and categorizing according to the WHO classification help in early and accurate diagnosis as well as prognosis of ovarian tumors. Although histopathological study is still the gold standard in diagnosing most of the primary ovarian tumors, may be supplemented by the newer techniques such as

\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|}
\hline
Study & Unilateral & Bilateral \\
\hline
Prabhakar and Maingi & 78.10 & 21.9 \\
Misra et al. & 82.98 & 17.02 \\
Couto et al. & 72.4 & 27.6 \\
Kuladeepa et al. & 68.42 & 31.58 \\
Present study & 75 & 25 \\
\hline
\end{tabular}
\caption{Comparison of laterality of malignant ovarian neoplasms}
\end{table}

\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|}
\hline
Size in cm & Okugawa et al. & Present study \\
& \textit{n}=1648 (%) & \textit{n}=120 (%) \\
\hline
<4 & 100 (6.07) & 29 (24.2) \\
5-9 & 658 (39.93) & 55 (45.8) \\
10-19 & 589 (35.74) & 30 (25) \\
>20 & 152 (9.22) & 6 (5) \\
Total & 1648 (100) & 120 (100) \\
\hline
\end{tabular}
\caption{Comparison of size ranges}
\end{table}

\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
Types of tumors & Swamy and Satyanarayana (\textit{n}=120) & Ashraf et al. (\textit{n}=127) & Jha and Karki (\textit{n}=161) & Santhosh et al. (\textit{n}=957) & Present study (\textit{n}=120) \\
\hline
Surface epithelial-stromal tumors & 61.6 & 52.7 & 82.2 & 67.9 & 84.2 \\
Sex cord-stromal tumors & 21.7 & 43.3 & 42.2 & 5.6 & 4.2 \\
Germ cell tumors & 11.7 & 3.1 & 3.1 & 23.1 & 10 \\
Metastatic tumors & 5.0 & 0.7 & 2.4 & 3.2 & 0.8 \\
Miscellaneous & - & - & - & - & 0.8 \\
\hline
\end{tabular}
\caption{Comparison of histological types of ovarian neoplasms}
\end{table}

\begin{table}[h!]
\centering
\begin{tabular}{|c|c|c|}
\hline
Classes of tumors & Jha and Karki & Present study \\
& Benign (%) & Malignant (%) & Benign % & Malignant % \\
\hline
Surface epithelial tumors & 66 (41) & 18 (11.2) & 80 & 4.2 \\
Sex cord-stromal tumors & 4 (2.5) & 1 (0.6) & 0.8 & 3.4 \\
Germ cell tumors & 65 (40.3) & 3 (1.9) & 9.2 & 0.8 \\
Metastatic & - & 4 (2.5) & - & 0.8 \\
Miscellaneous & - & - & - & 0.8 \\
\hline
\end{tabular}
\caption{Comparison of different classes of benign and malignant ovarian tumors}
\end{table}
immunohistochemistry, morphometric analysis, and flow cytometric analysis of ploidy status, to resolve the difficult, dilemmatic cases and also to predict the prognosis.

REFERENCES

A Comprehensive Study on Post Traumatic Temporal Contusion in Adults

R Renganathan¹, P John Paul², Heber Anandan³

¹Assistant Professor, Department of Neurosurgery, Tirunelveli Medical College, Tamil Nadu, India, ²Assistant Professor, Department of Neurosurgery, Madras Medical College, Chennai, Tamil Nadu, India, ³Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: The brain undergoes various types of strain during injury. The strain may be in the form of compression, tensile strain or shear strain. More than one type of mechanics and more than one type of strain are involved in most head injuries.

Aim: To study the epidemiology, clinical features, radiological findings, management and outcome of traumatic temporal contusion in brain injury.

Methods: Patients admitted in the head injury ward and diagnosed as having temporal lobe contusion were included. 106 patients were enrolled for this study.

Results: The overall mortality is 18.9% in traumatic temporal contusion. This study shows that 62.2% of the patients survived and 30.8% of the patients expired with surgical management. Seizure, abnormal pupillary response to light, oculocephalic reflex abnormality and the status of the basal cistern, midline shift and volume of the lesion are the significant factors, in this study.

Conclusion: Patients with a head injury in motor vehicle accidents, presenting with seizure, abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia must have intensive neurosurgical care. Temporal contusion quickly contributes to mortality because of its adjacent location to the brain stem.

Key words: Brain injury, Oculocephalic reflex, Traumatic temporal contusion

INTRODUCTION

Motor vehicle accidents (MVA) are the major cause of head injuries, and most commonly head injuries occur in adult population.¹ Primary head injuries are classified as diffuse brain injuries, focal brain injuries, and skull fractures. Contact injuries and head motion injuries are the basic mechanistic types of head injuries. The mechanical loading may be static or dynamic. The dynamic loading may be impulsive or impact type. Injuries occur when the tissue is not able to withstand the strain.² The capacity to resist the strain varies from tissues to tissues. Depending on that, different tissues have varying degree of injury.

In head injuries following trauma, cerebral contusion is the most frequently encountered lesion. The classic and primary hallmark of brain trauma is contusion. Contusions are defined as bruise of the brain surface with intact arachnoid and pia. If it is torn, it is called as laceration.³ When the intraparenchymal contusion is in continuity with an acute subdural hemorrhage, it is called as burst lobe. The contusions are classified as fracture contusion, herniation contusion, gliding contusion, coup, intermediate coup, and contrecoup contusion. Fracture contusions are contusion that arises from direct injuries and lies adjacent to the fracture site. Coup contusions are those that lie near the site of impact without any fracture. Contrecoup contusions are contusion that is not exactly below the impact site.⁴ Due to complex anatomy of the skull, it may not be exactly opposite the site of impact. Most contusion in closed head injuries in MVA is due to the acceleration-deceleration injuries. Among the cerebral contusion temporal contusion is found in most fatal head injuries. The location of the temporal lobe near the tentorial hiatus leads to rapid herniation in severe temporal lobe contusion.⁵
Aim
To study the epidemiology, clinical features, radiological findings, management, and outcome of traumatic temporal contusion in brain injury.

MATERIALS AND METHODS
This study is a prospective observational study. In this study, the epidemiological features, clinical findings and radiological findings that are routinely used to assess and to decide about the management of patients with post traumatic temporal contusion patients are analyzed. This study was conducted on the patients admitted in the head injury ward and diagnosed as having temporal lobe contusion at the Institute of Neurology, Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, India.

Inclusion Criteria
Adults with unilateral temporal contusion following trauma.

Exclusion Criteria
Patients treated and referred from other hospitals, patients with history of any previous intracranial procedures, patients with other associated parenchymal injuries, patients with bleeding diathesis, patients taking anticoagulant drugs, patients with any comorbid medical illness (diabetes mellitus, hypertension, renal failure, and chronic alcoholism), patients with other system injuries, and patients under the influence of alcohol. About 131 patients were enrolled for the study. 25 patients were excluded from this study based on the exclusion criteria mentioned above. The remaining 106 patients were enrolled for this study.

A detailed history about the patients diagnosed to have temporal contusion following head injury. The variable factors such as age, sex, mode of injury, time interval between injury and admission, loss of consciousness (LOC), seizures, vomiting, and ear, nose, throat (ENT) bleed were noted. Then, a detailed clinical examination was done and the status of the pupils reaction to light, size, extraocular movements/doll’s eye movement, and glasgow coma scale (GCS) were noted. Speech assessment was not included in this observational study. All the patients underwent routine investigations that include complete blood count, blood sugar, urea, creatinine, electrolytes, bleeding time, clotting time, blood grouping typing, urine albumin, sugar, deposits, X-ray chest posteroanterior view, and computed tomography (CT) scan brain plain with bone window. The CT scan brain images were analyzed to know the side, size, site of contusion, midline shift, and status of the basal cistern. The volume is calculated by the ellipsoid method, 1/2 x abc. (a) Greatest diameter in the CT scan slice, (b) diameter measured 90° to a, and (c) vertical height measured by the number of the slice. Patients with temporal contusion >20 ml, with midline shift more than 5 mm, with basal cistern effaced, with GCS <8 and progressive neurological deterioration referable to the lesion as per the brain trauma foundation surgical guidelines were operated and others are managed conservatively.4

RESULTS
A total of 106 patients with traumatic temporal contusion are included in this study. Among the 106 patients, most of them were in the age group of 21-30, followed by 31-40 then 41-50 and 51-60 age. 90 patients were between 21 and 60 years of age. Among the 106 patients, there are 101 males and 5 females. Males met with maximum head injuries. Temporal contusion caused by MVA predominantly occurs in 90 patients followed by fall (11) and assault (5) (Table 1).

In this study, there is a history of LOC in 83 patients, vomiting in 73, and ENT bleed in 24, and seizure in 32 patients. All the above clinical history is analyzed by Chi-square test individually for the outcome (Table 2).

Majority of the patients in our study were admitted with GCS 9-12 followed by patients with GCS 13-15. 7 patients presented with GCS 3-8 (Table 3).

GCS score for 39 patients deteriorated on the day of admission, and 67 patients remain stable (Table 4).

The pupillary response was normal in 60 patients, 31 show sluggish reaction (A) and 15 patients have no pupillary response (B) to light. Among the operated group 21 survived and 2 expired. 111 patients operated under Group B survived and 1 expired (Figure 1).

Asymmetry of the pupils is noticed in 39 patients. Oculocephalic reflex is absent in 6 and impaired in 48 cases. Out of 38 patients with asymmetry operated, 26 survived, and 12 expired, the 1 patient conservatively managed expired (Figure 2).

A total of 68 patients had pulse rate in the normal range, and bradycardia was noted in about 38 patients.

Right sided temporal contusion was present in 62 cases and left side contusion in 44 patients (Table 5).

By applying the ellipsoid method, the size of the contusion was measured. The volume >20 ml was presented in 15 patients, between 11 and 20 in 38 patients and <10 ml in 53 patients (Table 6).

In the CT scan brain, there is no midline shift in 52 patients.
A total of 39 patients has midline shift more than 5 mm (Table 7).

The CT scan brain shows fully effaced cistern in 32 patients, partially effaced in 24 patients and open cistern in 50 patients (Table 8).

A total of 39 patients are managed by surgical procedures and 67 patients are managed conservatively (Table 9).

Out of 106 patients treated for traumatic temporal contusion, 86 survived, and 20 expired. Among the 20 patients, expired 8 are treated conservatively, and 12 have undergone decompressive craniectomy and evacuation of the contusion (Table 10).

### Table 5: Side of contusion

<table>
<thead>
<tr>
<th>Side</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>44</td>
</tr>
<tr>
<td>Right</td>
<td>62</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
</tr>
</tbody>
</table>

### Table 6: Size of the contusion

<table>
<thead>
<tr>
<th>Size (ml)</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>53</td>
</tr>
<tr>
<td>11-20</td>
<td>38</td>
</tr>
<tr>
<td>&gt;20</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
</tr>
</tbody>
</table>

### Table 7: Midline shift-CT scan brain

<table>
<thead>
<tr>
<th>Shift</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>No shift</td>
<td>52</td>
</tr>
<tr>
<td>&lt;5 mm</td>
<td>15</td>
</tr>
<tr>
<td>&gt;5 mm</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
</tr>
</tbody>
</table>

### Table 8: Status of the basal cistern

<table>
<thead>
<tr>
<th>Status</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>50</td>
</tr>
<tr>
<td>Partially effaced</td>
<td>24</td>
</tr>
<tr>
<td>Fully effaced</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
</tr>
</tbody>
</table>

### Table 9: Management

<table>
<thead>
<tr>
<th>Management</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative</td>
<td>67</td>
</tr>
<tr>
<td>Surgery</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
</tr>
</tbody>
</table>
On analyzing the results of this study, MVA are the main mode of head injury. The males who are in the age group between 21 and 60 years are the main victims. Even though LOC, vomiting, seizure, and ENT bleed are the clinical features with decreasing order of frequency, this study shows, seizure as the significant factor for the outcome in patients with traumatic temporal contusion. This study also shows that low admission GCS and abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia are significant factors for the outcome of the patients with traumatic temporal contusion. This study concluded the status of the basal cistern, midline shift more than 5 mm and size of the temporal contusion more than 20 ml have more significance for the outcome of the head injury patients with temporal lobe contusion. The outcome of the patients treated by decompressive craniectomy and evacuation of the contusion shows 30.8% mortality and 69.2% survival.

**DISCUSSION**

In this study, it was observed that road traffic accidents were the common mode of injury most of the victims in MVA were males in the age group of 21-60 in this study. The National Crimes Records Bureau, accidental deaths and suicides in India, mentioned that most of the victims in MVA were in the age group 25-65 years (51.9%) and males constitute 85% of them.  

This study on post traumatic temporal contusion shows contrecoup temporal contusion was on the higher side, in concurrence with. The study by Tandon et al., at All India Institute of Medical Sciences also mentioned that contrecoup contusions were found in most severe head injury patients.  

According to Tandon et al., pupillary abnormalities occur in most of the operated cases of temporal contusion, this study also shows pupillary abnormalities were present in most of the patients surgically managed.  

Basal cistern effacement was noticed in CT scan brain of most patients with volume more than 30 ml. This observation supports Andrews, about the effect of intracerebral hematoma and the risk of brainstem compression. GCS deterioration was observed in patients with contusion volume between 11 and 20 ml. Choksey et al., in his retrospective series on the determinants of the outcome in patients with acute intracerebral hematoma mentioned that contusion volume more than 16 ml were more prone for deterioration.  

As mentioned by White et al., in his original article on early progression of traumatic cerebral contusion; characterization and risk factors, in this study, significant increase in the volume of the contusion was observed in patients with low GCS score.  

All of the patients with basal cistern effaced, conservatively treated, expired and patients who were operated had litter better outcome. This also goes well with the Ross Bullock, who mentioned that outcome in basal cistern effacement was worst and surgery must be done irrespective of the GCS of the patients who have basal cistern effacement.  

Decompressive craniectomy with evacuation of the contusion is the common surgical procedure performed in patients with temporal contusion. No temporal lobectomy was performed. As mentioned by Motah et al. better outcome is noticed in patients who underwent decompressive craniectomy.

**CONCLUSION**

Temporal lobe contusion occurs usually with MVA. Severe contusions with low GCS score contribute to mortality in such patients. Patients with head injury in MVA, presenting with seizure, abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia must have intensive neurosurgical care. CT scan brain should be done at the earliest. The size of the contusion, the status of the basal cistern and midline shift must be noted to find out the patients who need surgical management. All patients with deteriorating GCS must be evaluated by repeating the CT scan brain and reassess the radiological findings. This help to change the management strategy from conservative to surgical, acting as good clinical markers and lifesaving parameters.

GCS of the patients, abnormal pupillary response to light, abnormal oculocephalic reflex, bradycardia, and the radiological findings suggesting size >20 ml, status of the basal cistern and midline shift are really useful prognosticators of temporal lobe contusion. Temporal contusion quickly contributes to mortality because of its adjacent location to the brain stem.

Prevention is better than cure. Hence, civilians should be strictly instructed to follow the traffic regulation rules,
drive with appropriate speed. Strict traffic rules should be implemented to prevent MVA, as well as loss to the young lives.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Study of Role of Contact Points in Nose as a Causal Factor in Refractory Headaches and the Outcome of Surgical Treatment

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Abstract

Introduction: Contact point headaches have been attributed to intranasal contact between opposing mucosal surfaces, resulting in referred pain in the distribution of the trigeminal nerve. In subjects with primary headaches, contact points may be associated with treatment refractoriness.

Aim: The aim of this study is to evaluate the outcome of surgical treatment of patients with refractory headaches with intranasal mucosal contact points and to find out the most common contact point related to headache.

Materials and Methods: Patients clinically presenting with headache were selected. Only patients with headache due to rhinogenic causes without sinusitis were subjected to computed tomography scan of paranasal sinuses and diagnostic nasal endoscopy and were followed up to evaluate management.

Results: Overall 86% of patients felt marked improvement in their headaches while 8% had moderate and 6% had mild symptoms at the end of the study.

Conclusion: Surgical correction of contact points in the nose by functional endoscopic sinus surgery results in relief of chronic headache. The results of surgical outcome of treatment of chronic headache are evident mostly within 2 months of treatment.

Key words: Concha bullosa, Headache, Septal deviation

INTRODUCTION

Headache is a very frequent symptom, which is the complaint of half of the subjects that come to the physician. Chronic headache is distressing for both the patient and the physician to the former due to its nagging nature and to the latter for his inability to diagnose and for problems of self-medication in many cases.¹ The causes of headache are multifactorial varying from simple tension headache, migraine, myofascial spasm, temporomandibular joint arthralgia, vascular headache, refractory errors of vision, and brain tumors, it requires a multidisciplinary approach to diagnose the causative factors.² ³

Contact points may be a cause of secondary headache or an exacerbating factor for primary headaches.⁴ Mucosal contact headache is a newly added secondary headache disorder in the International Classification of Headache Disorders (ICHD-2) supported by limited evidence. According to the ICHD-2, these headaches are characterized by intermittent pain localized in the periorbital and medial canthal or tempororzygomatic regions, associated with evidence of mucosal contact points by nasal endoscopy or computed tomography (CT) imaging.⁵

The contact between the structures, in addition to being a mechanical stimulus in those regions considered as origin of the pain, promotes local inflammatory process, with release of mediators that are related with the painful process. The presence of mediators such as substance P
and histamine reduces pain threshold in the nasal mucosal receptors. The theory of local reflex triggered by contact between structures with release of vasoactive amines and onset of edema suggests that substance P acts as a mediator of this reflex. Substance P is a neuropeptide known since 1931 and found in sensitive nervous fibers of the nasal and paranasal mucosa, among other sites.6

Different stimuli in polymodal receptors located in the nasal mucosa such as infectious, chemical, caloric, or simply mechanical (pressure) irritating agents may generate an orthodromic impulse to the cerebral cortex, mediated by substance P, responsible for the painful stimulus. In addition to orthodromic impulse, such stimuli generate antidromic impulses, also capable of releasing substance P in the nasal mucosa, mediating plasma leak, vasodilation, smooth muscle contraction, and hypersecretion. This mechanism is called axonal reflex. Mucosa edema may increase the existing pressure among the structures, maintaining the process in a vicious cycle. The occurrence of local trauma by the contact and pressure between the structures can also lead to release of substance P in the nasal mucosa.7

Aim
The aim of this study is to evaluate the outcome of surgical treatment of patients with refractory headaches with intranasal mucosal contact points and to find out the most common contact point related to headache.

MATERIALS AND METHODS
This prospective study was conducted in the Department of Otorhinolaryngology, Government Tirunelveli Medical College Hospital. 50 patients with a rhinogenic headache without symptoms and signs of acute and chronic sinonasal inflammation that underwent treatment were included in the study. Effects of surgical treatment for contact point headache in 50 patients were assessed in the follow-up period of 12 months.

Inclusion Criteria
Refractory headaches (failed to standard pharmacological headache treatments) or refractory transformed migraine headaches having intermittent pain localized to the periorbital and frontal or tempororozymomatic regions from 6-month to 5-year duration. Diagnostic nasal endoscopic and/or CT imaging evidence of mucosal contact points without acute rhinos, contact points had to be present on CT scan.

Exclusion Criteria
Other patients were found to have some systemic cause for headache, cluster headache, with refractory error, and temporomandibular pain were thus excluded from this study. Patients with obvious frank sinogenic symptom attributable to headache were also excluded from the study.

All the patients were subjected to detailed history taking, clinical and systemic examination before ENT examination to rule out any systemic causes such as hypertension, migraine, tension headache, neurological causes, ophthalmological examination to rule out refractory errors, and gynecological checkup to eliminate premenstrual tension and premenopausal syndrome as a cause of headache. ENT examination consisted of a detailed history of headache periodicity, intensity, localization, precipitating factors, associated symptoms such as nausea, vomiting, nasal block, rhinorrhea, anosmia, epistaxis, and snoring anterior and posterior rhinoscopy was done to assess and evaluate any anatomical variation or pathological lesion.

The surgery included septoplasty, middle turbinectomy, uncinctomy, and ethmoidectomy. Septoplasty was always performed first, followed by a middle turbinectomy to gain access to the medial wall of ethmoid cells. Next, the ethmoidectomy was performed, and the medial wall of ethmoid sinuses was removed. Patients who had contact between the septum and middle turbinate (MT) had a partial middle turbinectomy and septoplasty performed.

RESULTS
The patients presenting were in the age range of 18-50 years. The mean age of presentation was 26.7 years. 26 were females (52%), and 24 were males (48%). It was found that 26% had bilateral nasal block and 76% had unilateral nasal block. 14 patients suffered from deviated nasal septum with spur (26%), isolated deviated nasal septum - 6, deviated nasal septum with MT variation - 5, with inferior turbinate hypertrophy - 3. 21 patients had concha bullosa - 44% (Unilateral - 10, bilateral - 7), concha associated with lateral nasal wall variation - 3, and associated with septal variation - 4. 10 patients had over pneumatized bulla - 26% (unilateral - 4, bilateral - 6), 5 patients had paradoxical MT - 10% (unilateral - 0, bilateral - 5), 2 patients had prominent agger nasi - 4% (unilateral - 1, bilateral - 1), and 13 patients had nasal blockage (26%).

Out of the total 50 patients, 16 subjects (32%) had headache at frontal region, followed by 12 subjects (24%) had headache at temporal region (Table 1).

The most common mucosal contact zone is found to be between MT with lateral nasal wall followed by MT with nasal septum (Table 2).
The most frequent mucosal contact point for headache is middle turbinate with lateral nasal wall. So lateral lamellectomy and anterior ethmoidectomy are the frequent surgeries performed (Table 3).

**Follow-up**

All patients were followed up from 2nd month to 6 months. At 2nd month, the headache was relieved in 43 patients and 7 patients had persistent headache. After 6-month post-operatively, only 5 patients had headache and 45 patients had relieved of their symptoms. The mean headache frequency was reduced from 14.2 to 2.4 days after 2 months of surgery. The mean headache severity was reduced from 5.9 to 1.48 in 2 months. Overall 86% of patients felt marked improvement in their headaches while 8% had moderate and 6% had mild symptoms at the end of the study.

**DISCUSSION**

Very few studies have assessed the surgical treatment of mucosal contact point headache. Limited studies show good surgical results in patients with contact point headaches. Out of the total of 50 patients, 26 were females, and 24 were males. As it was compared with Mahajan et al., 2003, the occurrence of male:female ratio of contact headache was equal.8

The most common age group of occurrence of contact headache is between 21 to 30 years −50%, followed by 31-40 years −28%. When compared with Mahajan et al., 2003, the percentage is almost equal (Table 4). The theory is growth of facial skeleton is completed at the age of 20 years. Hence, the mucosal contact point headache due to anatomical variant is common in these age groups. The male:female ratio is equal in both studies: 15:17 in Mahajan et al., 2003 and 24:26 in the current study. Deviation of the nasal septum was found in 26% of cases in the present study. In a study done by Salihoglu et al., had nasal septal deviations, and of those about 60% were bilateral and 40% were unilateral.9 Agger nasi cells are 6% in our study and 40% in a study done by Chopra et al. (Table 5).10

The mean headache frequency was reduced from 14.2 to 2.4 days after 6 months of surgery. The mean headache severity was reduced from 5.9 to 1.48 at 6 months. These parameters are compared with Behin et al. (Table 6).11

The mean headache frequency and mean headache severity are proportionately reduced in both the studies. In our study, in a series of 50 patients, 86% had significant improvement after 2 months of surgery. Tosun et al.12 showed, in a series of 30 patients, total relief was achieved in 43% of patients, significant improvement in 47% of patients, after endoscopic sinus surgery. As similar study by Harley et al., 2003, retrospectively analyzed the clinical outcome of surgical treatment of sinonasal headaches in 34 patients and found that all patients had at least one contact point between nasal septum and one of the turbinates. After surgery, reduction in headache intensity was reported by 91% and reduction in frequency by 85% of patients.

As per study done by Novak and Makek,14 most of the patients (356, 80%) were asymptomatic postoperatively, 45 (10%) had a sensation of pressure in the head on rate occasions but no further migraines, and 45 (10%) continued to experience headaches that occurred only rarely and were mild and of short duration. The overall success rate was 98%.
CONCLUSION

Surgical correction of contact points in the nose by functional endoscopic sinus surgery (FESS) results in relief of chronic headache. The results of surgical outcome of treatment of chronic headache are evident mostly within 2 months of treatment. Contact point - as an etiological factor for headache is more relevant in 20-30 years of age group, i.e. after completion of development of faciomaxillary skeleton. The most frequent contact point for headache is MT with lateral nasal wall. Refractory migraine headache can be successfully treated in carefully selected patients after precise pre-operative localization of exact point by modern investigations (nasal endoscopy) and appropriate surgical interventions (FESS) Patients diagnosed to have a chronic refractory headache/transformed migraine should be accessed for mucosal contact point headache and its appropriate surgical management for cure.

REFERENCES


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Efficacy of Electroconvulsive Therapy in Treatment-Resistant Psychiatric Disorders - An Intervventional Study from Jammu and Kashmir, North India

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Abstract

Background: Electroconvulsive therapy (ECT) is a biological therapy where seizures are induced under medical supervision by passing electric current across the scalp. Despite its unparalleled record of safety and efficacy, it is regarded as controversial treatment due to frequent misrepresentations of ECT in the media, and distorted information about ECT which was conveyed to public by various peoples having social and political agendas.

Objective: To study the efficacy of ECT in the treatment resistant psychiatric disorders.

Materials and Methods: This study which was prospective and interventional was conducted over a period of 1 year and 2 months on 56 psychiatric patients who were given ECT following treatment resistance. The patients were assessed by clinical global impression (efficacy subscale) 1 day after last ECT, at 3 months follow-up, and at 6-month follow-up.

Results: The P value of comparison of efficacy index between end of ECT course, at 3 and 6 months follow-up is ≤0.0001 which is highly significant as 50% of the studied patients attained score 1 on efficacy index at 3 months after ECT as compared to 12% at the end of ECT course and 39.5% at 6 months after ECT course.

Conclusion: ECT is very effective in treatment resistant psychiatric and its efficacy increases on follow-ups.

Keywords: Efficacy of electroconvulsive therapy, Electroconvulsive therapy, Treatment-resistant psychiatric disorders

INTRODUCTION

Psychiatric disorders are among the leading causes of morbidity and mortality worldwide. Despite considerable advances in the understanding of the pathophysiology and the availability of effective therapies that include pharmacological and non-pharmacological approaches (somatic and psychotherapeutic), there are still a sizeable number of patients that do not respond adequately to treatment, either in the magnitude of the response or the persistence of the response. Treatment resistance is variably defined in different psychiatric disorders, and there are multiple factors that contribute to it, among them genetic, environmental, medical, and psychiatric comorbidities. The consequences of treatment resistance are devastating for the patients, including poor quality of life, chronic disability, increased risk for medical illness, substance and alcohol abuse, and suicide, as well as to families and societies who deal with the increasing psychological and financial burden. Careful diagnostic reevaluation of patients who appear treatment resistant must be conducted and the most effective evidence-based strategies applied to their care.¹

Electroconvulsive therapy (ECT) has been used throughout the world since 1938 despite many pharmaceutical treatment advances. It is the oldest method of somatic treatment; long before chlorpromazine and lithium came.² It is the only form of physical treatment which has survived the
advent of psychopharmacology. The survival of ECT over the years is only because of its time-tested efficacy in ameliorating and reducing psychiatric symptoms. Despite its high efficacy and very low side effects, it has remained very controversial treatment due to negative publicity, stigmatizations attached to it and lack of awareness even among medical professionals. Due to these reasons, ECT has received low acceptability in the medical community and is one of the most underutilized biological treatments. The standards and practices of ECT across the globe is strikingly diverse and different. In the developing countries like ours conditions though non-ideal is based on the practical issues especially the factors such as poverty and poor infrastructure. The ECT as a therapeutic tool is used widely in India may be even more than in the West. ECT is used for the same very indications in India as in the West with similar results. The case of ECT is strengthened by its remarkable record of safety. ECT compares favorably with any procedure in all of medicine for its low morbidity and mortality. With recent advances in ECT technique, the safety profile of the treatment continues to be refined, and ECT is emerging as a mainstream treatment in the psychiatric armamentarium. Furthermore, it has a predictably rapid onset of effect and can be performed in both inpatient and outpatient settings.

**MATERIALS AND METHODS**

This study was conducted at Postgraduate Department of Psychiatry of Government Medical College, Srinagar over a period of 1 year and 2 months during which all the patients of treatment resistant psychiatric disorders who were taken for ECT were included whereas those patients who had never received drug trial and in whom ECT was given as acute management were excluded from the study. Pharmacotherapy to these patients was continued during as well as post-ECT. Patients were allowed to participate in the study only after written consent either from themself or from their legal caretaker. Overall, 56 patients were included in the study. The patients were assessed by clinical global impression (CGI) efficacy subscale1 day after last ECT, at 3 months follow-up and at 6 month follow-up. Efficacy was defined with CGI efficacy subscale by comparing the degrees of therapeutic effect and side effects due to ECT and following scores were attained. (0) Not assessed, (1) vast improvement with no side effects, (2) vast improvement with side effects which do not significantly interfere with patients functioning, (3) vast improvement with side effects which significantly interfere with patients functioning, (4) vast improvement with side effects which outweigh therapeutic effects, (5) marked improvement with no side effects, (6) marked improvement with side effects which do not significantly interfere with patients functioning, (7) marked improvement with side effects which significantly interfere with patients functioning, (8) marked improvement with side effects which outweighs therapeutic effects, (9) moderate improvement with no side effects, (10) moderate improvement with side effects which do not significantly interfere with patients functioning, (11) moderate improvement with side effects which significantly interfere with patients functioning, (12) moderate improvement with side effects which outweighs therapeutic effects, (13) minimal improvement with no side effects, (14) minimal improvement with side effects which do not significantly interfere with patients functioning, (15) minimal improvement with side effects which significantly interfere with patients functioning, and (16) minimal improvement with side effects which outweighs therapeutic effects.

**Statistical Analysis**

Quantitative data were analyzed using one-way analysis of variance, post hoc tests were used for pairwise comparison of groups, and qualitative data were analyzed using Pearson's Chi-square test. The \( P \leq 0.05 \) was considered to be statistically significant. Data were analyzed using SPSS Version 20.0.

**OBSERVATION AND RESULTS**

During the study following observations were made.

Table 1 and Graph 1 shows that maximum patients, i.e., 53.6% were of unipolar depression.

Table 2 and Graph 2 shows efficacy index at the end of ECT course, at 3 months follow-up and at 6 months follow-up of the studied patients. At the end of ECT course 6 (12%) patients attained score 1, 11 (22%) patients attained score 2, 9 (18%) patients attained score 3, 3 (6%) patients attained score 4, 7 (14%) patients attained score 5, 3 (6%) patients attained score 6, 3 (6%) patients attained score 7, 1 (2%) patient attained score 8, 3 (6%) patients attained score 9, 2 (4%) attained score 10, 4 (8%) patients attained score 11, and 1 (2%) patient attained score 12. At 3 months follow-up 25 (50%) patients attained score 1, 2 (4%) patient attained score 2, 5 (10%) patients attained score 5, 1 (2%) patient attained score 6, 11 (22%) patients attained score 9, 5 (10%) patients attained score 12, and 1 (2%) attained score 14. At 6 months follow-up 17 (39.5%) patients attained score 1, 12 (27.9%) patients attained score 5, 9 (20.9%) attained score 9, and 5 (11.6%) attained score 13. The \( P \) value of comparison was \( \leq 0.0001 \) which was highly significant.

**DISCUSSION**

ECT was introduced to psychiatric practice in 1934. It was widely hailed as an effective treatment for schizophrenia and quickly recognized as equally effective for the affective disorders. Like other somatic treatments, it was replaced...
by psychotropic drugs introduced in the 1950s and 1960s. However, two decades later, ECT was recalled to treat pharmacotherapy-resistant cases. Experiments to sustain its benefits with medications and with continuation ECT are underway.6

The exact mechanism of action of ECT is not known, but there is focus on change in neurotransmitter receptors and second messenger systems. Nearly, every neurotransmitter is affected by ECT, but downregulation of postsynaptic beta-adrenergic receptors was seen following a series of ECT sessions. ECT may cause an increase in postsynaptic serotonin receptors, no change in serotonin receptors, and a change in the presynaptic regulation of serotonin release. ECT has also been reported to effect changes in the muscarinic, cholinergic, and dopaminergic neuronal systems. In second-messenger systems, ECT has been reported to affect coupling of G-proteins to receptors, the activity of adenylyl cyclase and phospholipase C, and the regulation of calcium entry into the neurons.7 It may cause increased concentrations of the neurotransmitters dopamine, gamma-aminobutyric acid, and glutamate in certain areas of the brain.8 A course of ECT may affect brain-derived neurotrophic factor, but the findings have been inconsistent as it remains to be established that an increase in the production of growth factors is relevant to the mode of action of ECT, but the suggestion merits further research.9 The full impact of ECT as an intervention is yet to be felt.6 This study was conducted to find efficacy of ECT in treatment-resistant psychiatric disorders.

In our study majority our patients, i.e. 53.6% were of unipolar depression as the prevalence of depression (55.72%) is high in Kashmir and the high rates of the prevalence in the valley were largely attributed to continuing conflict in Kashmir during the past 20 years which has resulted in a phenomenal increase in psychiatric morbidity especially depression.10 Other studies too had found similar results.11,12

### Efficacy Index of the Studied Patients

Table 1: Clinical diagnosis of the studied patients

<table>
<thead>
<tr>
<th>Clinical diagnosis</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unipolar depression</td>
<td>30 (53.6)</td>
</tr>
<tr>
<td>BPAD in depression</td>
<td>11 (19.7)</td>
</tr>
<tr>
<td>BPAD in mania</td>
<td>10 (17.8)</td>
</tr>
<tr>
<td>OCD</td>
<td>5 (8.9)</td>
</tr>
</tbody>
</table>

Table 2: Efficacy index of the studied patients

<table>
<thead>
<tr>
<th>Efficacy index score</th>
<th>End of ECT course (%)</th>
<th>3 months follow-up (%)</th>
<th>6 months follow-up (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6 (12)</td>
<td>25 (50)</td>
<td>17 (39.5)</td>
</tr>
<tr>
<td>2</td>
<td>11 (22)</td>
<td>2 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>3</td>
<td>9 (18)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>4</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>5</td>
<td>3 (6)</td>
<td>5 (10)</td>
<td>12 (27.9)</td>
</tr>
<tr>
<td>6</td>
<td>7 (14)</td>
<td>1 (2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>7</td>
<td>3 (6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>8</td>
<td>1 (2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>9</td>
<td>3 (6)</td>
<td>11 (22)</td>
<td>9 (20.9)</td>
</tr>
<tr>
<td>10</td>
<td>2 (4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>11</td>
<td>4 (8)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>12</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>13</td>
<td>1 (2)</td>
<td>5 (10)</td>
<td>5 (11.6)</td>
</tr>
<tr>
<td>14</td>
<td>0 (0)</td>
<td>1 (2)</td>
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<tr>
<td>15</td>
<td>0 (0)</td>
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<tr>
<td>16</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>50 (100)</td>
<td>50 (100)</td>
<td>43 (100)</td>
</tr>
</tbody>
</table>

Chi-square=94.420, P≤0.0001, ECT: Electroconvulsive therapy

Graph 1: shows clinical diagnosis of the studied patients

Graph 2: Shows efficacy index of the studied patients
the therapeutic response (efficacy index) section in both clinical and research setting.\textsuperscript{4}

Out of 56, 50 patients completed ECT course. All 50 patients who had completed a course of ECT were followed up to 3 months whereas only 43 patients were followed up to 6 months.

At the end of ECT course 6 (12%) patients attained score 1, 11 (22%) patients attained score 2, 9 (18%) patients attained score 3, 3 (6%) patients attained score 5, 7 (14%) patients attained score 6, 3 (6%) patients attained score 7, 1 (2%) patient attained score 8, 3 (6%) patients attained score 9, 2 (4%) attained score 10, 4 (8%) patients attained score 11, and 1 (2%) patient attained score 13.

At 3 months follow-up 25 (50%) patients attained score 1, 2 (4%) patient attained score 2, 5 (10%) patients attained score 5, 1 (2%) patient attained score 6, 11 (22%) patients attained score 9, 5 (10%) patients attained score 13, and 1 (2%) attained score 14.

At 6 months follow-up 17 (39.5%) patients attained score 1, 12 (27.9%) patients attained score 5, 9 (20.9%) attained score 9, and 5 (11.6%) attained score 13.

The $P$ value of comparison of efficacy index between end of ECT course, at 3 and 6 months follow-up is $\leq 0.0001$ which is highly significant as 50% of the studied patients attained score 1 on efficacy index at 3 months after ECT as compared to 12% at the end of ECT course and 39.5% at 6 months after ECT course. The reason for this might be that the side effects due to ECT are usually mild and gets reversed in few days to few weeks. The most severe side effect, i.e., memory loss generally improves few weeks after ECT whereas other side effects such as nausea, vomiting, headache, body aches, attention, and concentration problems are temporary side effects that nearly always go away within hours to days after ECT.\textsuperscript{13} As a result side effects due to ECT usually wanes of within few days to few weeks after ECT course and thus maximum number of improved patients attains Grade 1, i.e., vast improvement with no side effects at follow-ups.

Moreover, we were using pharmacotherapy aggressively in our patients during and post-ECT which helps in increasing the therapeutic effects of ECT and thus prevents relapse in patients treated with ECT. Various researchers had also found that psychotropic medications are safer in combination with ECT and may augment antidepressant effects of ECT and helps to prevent relapses after ECT.\textsuperscript{14}

The finding can further be supported by Nordenskjold\textsuperscript{15} who found that at 2 months only 18% of patients whereas at 6 months only 29% of patients treated with ECT plus pharmacotherapy were relapsed and thus therapeutic effects of ECT were maintained insignificant number of patients.

**CONCLUSION**

From this study, we are able to counsel that ECT is an efficient modality for treatment-resistant psychiatric disorders with delicate side effects that typically wanes off in few days to few weeks so increasing efficacy of ECT in follow-ups. However, there's little knowledge accessible relating to efficacy of ECT using CGI-E subscale, and therefore additional analysis during this field must be done using CGI-E subscale.

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Mullerian Agenesis - Genetic Inheritance: A Case Report

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INTRODUCTION

MRKH syndrome was described between 1829 by physiologist Mayer (1829), Rokitansky (1938), Kuester (1910), and gynecologist Hauser (1961).¹ MRKH is the second most common cause of primary amenorrhea, next to gonadal dysgenesis. The incidence of MRKH is 1 per 4000-10000 females, and it results from interrupted embryonic development of the paired mullerian (paramesonephric) ducts between the 4-12th weeks of gestation. The molecular basis for MRKH syndrome has yet to be identified, but multiple genes are being investigated. Genetic transmission is believed to be in an autosomal dominant fashion with incomplete penetrance and variable expressivity.²³

Specialty care is necessary to discuss non-surgical and surgical options with psychosocial support.⁴

CASE REPORT

A 22-year-old unmarried female presented to Santokba Durlabhji Memorial Hospital, Gynaecology Department, with a complaint of primary amenorrhea. Her past medical and surgical history was not significant. Her secondary sexual characters were well developed. Pubic and axillary hairs well-developed Tanner stage 4, breast development is also Tanner stage 4. Her daughters of her 2 uncles were having the same complaint of primary amenorrhea having age 18 and 16 years.

A multidisciplinary and comprehensive approach must be sought for mullerian agenesis.
DISCUSSION

First sign of MRKH syndrome is a primary amenorrhea in young women presenting otherwise with normal development of secondary sexual characteristics and normal external genitalia, with normal and functional ovaries, and karyotype (46, XX) without visible chromosomal anomaly. MRKH may be isolated (Type I); however, it is more frequently associated with renal, vertebral, and to a lesser extent, auditory, and cardiac defects (MRKH Type II or MURCS association).5

Some studies investigated genetic mutations during the earliest phases of the embryonic development. There have been several assumptions about involved genes, such as Wilms tumor 1 (WT1), PAX2 (it is thought that the WT1 oncosuppressor may act as repressor of the transcription of PAX2), HOXA7–HOXA13 (highly important genetic clusters for the correct embryogenesis) [9], and pre-B-cell leukemia homeobox 1 (PBX1), although some researches on direct implications of these genes have not given certain outcomes; the wingless-type MMTV integration site family, member 4 (WNT4) gene seems to be surely involved, since it intervenes on embryonic genital female development with a specific function.6,7

Shokeir investigated 10 families with several members affected by MRKH syndrome. In the majority of them, there were some affected paternal relatives, raising the possibility of an autosomal dominant inheritance with sex-limited (female) expression and incomplete penetrance. It was suggested that female carriers develop mullerian abnormalities, whereas male carriers do not manifest any deleterious effect.

The genetic basis of MRKH syndrome is largely unknown. Array comparative genomic hybridization (CGH) analyses have detected submicroscopic imbalances at 1q21.1, 4q34-qter, 17q12, 22q11.21, and Xq21.31. Recurrent changes have also been identified at 22q11q21.1 and 17q12.1. However, analysis of candidate genes has been inconclusive.

CONCLUSION

MRKH is a malformation complex comprising absent vagina and absent or rudimentary uterus. This is understandable given the incomplete degree of penetrance,
variable expressivity, and similarities of this syndrome with other genetic disorders. Treatment which consists in creating a neovagina is generally offered to patients when they are ready to start sexual activity.8

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Atypical Presentations of Nasopharyngeal Masses: A Case Series

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Case No 1

A 70-year-old hypertensive, smoker, and non-alcoholic male patient presented with the complaints of nasal obstruction and decreased sense of smell for the past 4 years. Diagnostic nasal endoscopy revealed a pale-pinkish polypoidal mass seen attached to the middle turbinate on left side occupying both nasopharynxes (Figure 1). Mass is non-friable and does not bleed on touch. Mass extends beyond the choana and is filling the nasopharynx. There is no cervical lymph node enlargement. Conventional X-ray paranasal sinuses and computed tomography (CT) revealed soft-tissue opacity in the left nasal cavity and left maxillary sinuses. Lesion was extending posterior nasal cavity, upper part of posterior nasal septum, and nasopharynx. Magnetic resonance (MR) angiogram showed no increased vascularity or extension into brain. However, deossification of intervening bone is seen. Microscopic examination of the excision biopsy mass suggested inverted papilloma.

The patient was thoroughly evaluated and endoscopic removal of mass from the nasal cavity, maxillary ethmoidal, sphenoidal, and frontal sinuses was done. No adjuvant treatment was given. The patient became asymptomatic after surgery and during follow-up.
Case No 2
A 70-year-old hypertensive, diabetic, and smoker male patient presented with recurrent episodes of epistaxis. Each episode required bilateral anterior and posterior nasal packing.

Diagnostic nasal endoscopy revealed a mass arising from the nasopharynx attached to the inferior turbinate and soft palate. CT scan revealed a mass filling the left sphenoid, ethmoid sinuses and left nasal cavity with erosion of the nasal septum, turbinates and cribiform plate, ethmoid air cells, lamina papyracea, and root of sphenoid sinus on left side (Figure 2). The patient underwent excision biopsy and histopathology report came out to be olfactory neuroblastoma (ONB) which was confirmed with an IHC study.

Case No 3
A 36-year-old woman presented to our Outpatient Department (OPD) with complaints of nose block and mild pain mainly on right side foreign vague discomfort in the nasopharynx and thick scanty post-nasal discharge and a sense of ill-being and tiredness. On examination, she had a gross DNS to the right side with turbinate hypertrophy and was taken up for septoplasty. There was a raised erythrocyte sedimentation rate. There was no cervical lymphadenopathy and mild splenomegaly.

Pre-operatively, a diagnostic nasal endoscopy (DNE) was also done and a mass was seen in the nasopharynx almost completely filling the choana. Histopathology slides showed respiratory epithelium, multiple granulomas filled with Langerhan's giant cells and epithelial cells and a highly vascular stroma which was reported as tuberculosis. AFB staining of the slides did not reveal acid-fast bacilli. Hence, the patient was evaluated further for tuberculosis post-operatively. Mantoux test and sputum AFB were negative. A pulmonology evaluation showed no signs of pulmonary tuberculosis. She was treated as primary case of extra pulmonary tuberculosis with antituberculosis treatment category 1 for 6 months. After 1 month of treatment, the patient was reassessed with DNE and the size of mass was found to be considerably reduced. She also reported considerable relief of foreign body sensation. Another DNE done after 6 months of treatment, a repeat biopsy was taken and found to be normal.

Case No 4
A 53-year-old hypertensive male patient came with complaints of nasal obstruction, ear block, and snoring for 4 years. Clinical examination including nasal endoscopy revealed a pale pink mass completely filling the nasopharynx (Figure 3). It was rubbery in consistency and non-friable mass extending up to upper part of soft palate with minimal airway. There was no cervical lymphadenopathy. CT examination revealed a mass filling the nasopharynx. The patient underwent excision biopsy of the mass. Histopathological study revealed non-Hodgkin's lymphoma. The patient was referred for radiotherapy.

Case No 5
A 58-year-old male diabetic and COPD patient with no addictions presented with recurrent episodes of nasal bleed for 2 months. Bleeding was in moderate amount which subsided itself. Clinical examination and nasal endoscopy showed a reddish mass above the Eustachian tube orifice in the nasopharynx. Mass was friable. Conventional CT revealed a small irregularity in the nasopharyngeal region. Microscopic examination of the incision biopsy showed abnormal lymphoid hyperplasia pointing toward a diagnosis of lymphoma. IHC was DNE and the patient referred for chemoradiation.

Case No 6
A 45-year-old hypertensive male patient presented with complaints of nasal obstruction for 3 months which was progressive in nature. He underwent surgery 6 times for recurrence of rhinosporidiosis for 25 years. Clinical examination and diagnostic nasal endoscopy showed a rhinosporidial mass attached to the nasopharynx, Eustachian tube orifice, and soft palate. Part of cartilaginous and most of bony septum, inferior turbinate, and middle turbinate are partly destroyed. The patient underwent surgery and histopathology report came out to be rhinosporidiosis.

DISCUSSION
Inverted Papilloma
Sinonasal papillomas account for 0.5-4% of all nasal tumors and exophytic papillomas are the most commonly diagnosed subtypes (50% each) and oncocytic papillomas are the rarest type (3-5%). An average age of 44 years being more likely to have an exophytic papilloma, and patients one decade older were more likely to show one of the remaining two types.

IPs tended to arise from the maxillary, ethmoid and sphenoid sinuses, and lateral nasal wall. Exophytic papillomas were most common within the nasal cavity on the nasal septum and within the vestibule. OSP exhibited a predilection for the ethmoid sinuses. The mechanism by which IP causes the bony reactions like osteitis may be secondary to the secretion of the bone morphogenic peptide tumour cells.
CT findings highly suggestive of papilloma include a contiguous nasal cavity and sinus mass with heterogeneous contrast enhancement and unilateral sinus opacification.4,6,7 Thinning or bowing of adjacent bone is seen, most commonly the medial wall of the maxillary sinus and the lamina papyracea. When bony erosion or destruction is seen, associated malignancy must be considered. Focal hyperostosis and osteitis within the opacified sinus has been shown to predict the site of origin of IP.4,6,11 MR imaging (MRI) can be useful in defining the extent of the tumor and differentiating the tumor mass from inspissated mucus and for detecting intracranial and intraorbital extension of tumor.

The human papilloma virus (HPV) types 6, 11, 16, and 18 have been implicated as a leading factor. The differential expression of certain cell cycle proteins may significantly contribute to the transformation process.12 Chronic inflammation of sinuses has also been hypothesized as a precursor for the development of sinonasal papillomas.5,15 Other potential risk factors, including alcohol use, tobacco use, and history of prior sinus surgery, failed to show a significant association with any subtype of papilloma in the study by Vorasubin et al. 5-15% of cases of IP can be associated with malignancy and 4-17% of cases of OSP have been associated with malignancy.3,13,14

Infection with HPV16 and 18 may occur early in the process of tumorigenesis with several other insults required to transform benign IP to dysplasia or malignancy.6

On gross analysis, IP usually appears large, firm, and gray in color with a multinodular, polypoid, uneven surface.6 Exophytic papillomas grossly appear as gray-tan, exophytic, mushroom-shaped verrucous papillary proliferations classically arise from the anterior nasal septum attached to the underlying mucosa by a narrow stalk.2,7,15 Histologically, markedly thick inverted or endophytic growth of non-keratinizing transitional cells is seen. The thick epithelium undergoes squamous maturation and inverts into the stroma with a distinct basement membrane that separates the epithelium from the underlying connective tissue stroma (Figure 4). Surface keratinization and a granular cell layer are uncommon; numerous intraepithelial microcysts containing cell debris, macrophages, and mucin are present.

**Treatment**

Although external approaches were once exclusively used, endoscopic resection has been gaining popularity because of decreased morbidity without compromising recurrence rates. Ultimately, the type of approach depends on the site of tumor attachment and extension.6,16-20

The site of tumor attachment is crucial to identify to ensure complete resection, which involves complete removal of the affected mucosa and mucoperiosteum, because incomplete or limited resections are thought to be the leading cause of recurrence.21
Microscopic foci of residual papilloma can be concealed within the bone at the attachment site. Therefore, drilling the bone at the site of attachment can further reduce the risk of recurrence. Some reports suggest the use of radiation therapy for locally advanced papillomas or papillomas with multiple recurrences.

About 5-60% of IP cases can recur, shown to increase the risk of recurrence for IP including tobacco exposure, increased tumor size, increased hyperkeratosis, squamous epithelial hyperplasia, increased number of mitoses, bilaterality, and the lack of inflammatory polyps. In addition, IP originating from the frontal sinus tends to have multiple recurrences, likely because of technical difficulties operating in this location. Most recurrences usually occur within the first 3 years.

**ONB**

ONB is an uncommon malignant neuroectodermal nasal tumor comprising about 2% of all sinonasal tract tumors with an incidence of approximately 0.4 per million population. ONB are thought to arise from the specialized sensory neuroepithelial olfactory cells that are found in the upper part of the nasal cavity. Specifically, Jacobson’s vomeronasal organ, sphenopalatine ganglion, ectodermal olfactory placode, ganglion of Loci (nervus terminalis), autonomic ganglia of the nasal mucosa, and the olfactory neuroepithelium (cribriform plate and superomedial surface of the superior turbinate) are all sites of origination for this malignant neural crest derived neoplasm.

A bimodal age distribution in the 2nd and 6th decades of life is seen without a gender predilection, usually presenting with unilateral nasal obstruction (70%) and epistaxis (50%), less commonly headaches, pain, excessive lacrimation, rhinorrhea, anosmia, and visual disturbances. Even though the tumor arises from the olfactory neuroepithelium, anosmia is not a common complaint (5%). The tumors tend to be locally aggressive, involving adjacent structures (orbit and cranial cavity).
A “dumbbell-shaped” mass extending across the cribriform plate is one of the most characteristic imaging findings, similar to our case. The upper part in the intracranial fossa, with the “waist” at the cribriform plate. CT will show speckled calcifications and bone erosion. Contrast-enhanced CT will show homogenously enhancing mass, with non-enhancing areas suggesting regions of necrosis. T2-weighted images may show hyperintense regions which correlate to the cystic regions at the advancing edge. There is often marked tumor enhancement after gadolinium.

Histologically, a lobular architecture comprised “primitive” neuroblastoma cells. The tumor cells are “small, round, and blue” cells slightly larger than mature lymphocytes, with a very high nuclear to cytoplasmic ratio (Figures 5 and 6).

Two types of rosettes are recognized: The delicate, neurofibrillary, and edematous stroma forming the center of a cuffing or palisaded arrangement of cells in Homer–Wright pseudorosettes (30%) while a “gland-like” tight annular arrangement is seen in Flexner–Wintersteiner rosettes (5%). Special stains like silver stains such as Bodian, Grimelius, and Churukian-Schenk may highlight the neurosecretory granules but immunohistochemistry is the more popular diagnostic tool.

Management

The Kadish et al. proposed staging system from 1976 is still used, even though Dulguerov and Calcaterra have proposed a tumor, node, and metastasis-type classification. The Kadish system includes: A - tumor limited to nasal cavity; B - nasal cavity and paranasal sinuses; and C - beyond nasal cavity and sinuses. Most tumors are in Stage C (about 50%), survival rates are 75-91% for Stage A, 68-71% for Stage B, and 41-47% for Stage C. Overall, there is a 60-80% 5-year survival. Low-grade tumors have an 80% 5-year survival while high-grade tumors have a 40% of survival.

Due to potentially significant bleeding, biopsy should be used with caution. Complete surgical elimination frequently requires a bicranial-facial approach (trephination) which removes the cribriform plate and is usually followed by a course of radiotherapy as the treatment of choice to achieve the best long-term outcome. An elective neck dissection is not warranted. Palliation with chemotherapy is achieved for advanced unresectable tumors or for disseminated disease. Autologous bone marrow transplantation has achieved long-term survival in limited cases.

Recurrences develop in about 30% of patients (range 15-70%), usually within the first 2 years after initial management. Cervical lymph node metastasis (up to 25%) or distant metastases (approximately 10%) develop irrespective of the grade of the tumor, the most frequent sites being lungs and bones. Overall survival is adversely affected by female gender, age <20 or more than 50 years at initial presentation, high tumor grade, extensive intracranial spread, distant metastases, tumor recurrence, a high proliferation index, and polyploidy/aneuploidy.

Primary Tuberculosis of Nasopharynx

Nasopharyngeal tuberculosis comprises only <1% of extrapulmonary tuberculosis found in the upper respiratory tract. According to Rohwedder, only 0.1% of nasopharyngeal involvement were detected in primary active pulmonary tuberculosis patients. However, the nasopharynx is a relatively silent region, and the disease may be more common than suspected, especially in endemic areas and with an increase in HIV, but in our case, the patient was immune competent. Nasopharyngeal tuberculosis comprises only <1% of extrapulmonary tuberculosis found in the upper respiratory tract. According to Rohwedder, only 0.1% of nasopharyngeal involvement were detected in primary active pulmonary tuberculosis patients. However, the nasopharynx is a relatively silent region, and the disease may be more common than suspected, especially in endemic areas and with an increase in HIV, but in our case, the patient was immune competent.
tuberculosis is seen most commonly in women and in 5-6th decades.\textsuperscript{30,32}

Cervical lymphadenopathy, nasal obstruction, rhinorrhea, epistaxis, serous otitis media, and hearing loss are the most common clinical symptoms.\textsuperscript{33,34} Tuberculosis can involve the nasopharynx primarily without affecting any other system or secondary to pulmonary or extra pulmonary involvement.\textsuperscript{35} Many a times, tuberculosis of nasopharynx is underdiagnosed due to less obvious signs and symptoms in all the cases.\textsuperscript{36} Atypical presentations with diplopia and sleep apnea have also been reported.\textsuperscript{37,38}

Endoscopic examination may reveal a polypoidal mass, ulceration, plaque, or diffuse mucosal thickening of the nasopharynx.\textsuperscript{39-41} For definitive diagnosis, repeated biopsies should be done. Epithelioid giant cells and granulomatous inflammation that was characterized by caseous necrosis are the usual pathological findings. Isolation of acid-phase bacilli and produce \textit{Mycobacterium tuberculosis} in the culture is very difficult procedure in the nasopharyngeal tuberculosis.\textsuperscript{42} As acid-fast bacilli are found in only 10\% of tuberculosis specimens by direct examination,\textsuperscript{4} Arnold et al.\textsuperscript{43} investigated the use of tuberculostearic acid in formalin fixed, paraffin wax embedded tissue specimens and found it useful for rapid diagnosis. Furthermore, MRI and positron emission tomography (PET) may be useful for differentiating nasopharynx cancer from tuberculosis but false positives are quite high as per the study by Kim.\textsuperscript{44}

The treatment of extrapulmonary tuberculosis is same as that of pulmonary tuberculosis.\textsuperscript{45} Patients are 2-month treated with 4 drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol), followed by 4-month treated with two drugs (isoniazid and rifampicin) as done with our case which gave good response.

**Non-Hodgkin’s Lymphoma**

The head and neck is the second most common region for extranodal lymphoma after gastrointestinal tract. Among various head and neck sites, Waldeyer’s ring, which is an area encompassed by the nasopharynx, tonsil, and base of the tongue, is most often involved by non-Hodgkin’s lymphoma (NHL).\textsuperscript{46} Patients of any age group can be affected. However, most patients are middle-to-older age with male preponderance. Death in these patients is due to sepsis or due to compression of the vital organs by the enlarged lymph nodes.\textsuperscript{47} A substantial percentage of NHL arise from tissue other than lymph nodes and even from sites which normally contain no lymphoid tissue.\textsuperscript{48} Certain workers such as pesticide applicators, workers in the petroleum, organic chemicals, food preservatives, and plastic and synthetic industries have slight increased risk of NHL.\textsuperscript{49} The most common chromosomal abnormality associated with NHL is the t (14; 18) (Q32; Q21) translocation that is found in 85\% of follicular lymphomas and 25-30\% of intermediate grade of NHL.\textsuperscript{50} Clinically, lymphadenopathy (most common), fever, night sweat, weight loss, spleen involvement (20\%), and involvement of liver (advance disease).\textsuperscript{50,51}

Usually, hematologic and biochemical profiles of the patients are normal. Histologically seen as small round tumor cells (Figures 7 and 8) MRI of the head and neck, chest, abdomen, and pelvis is the mainstay for staging of NHL. However, concurrent PET with 18\textsuperscript{F}-fluorodeoxyglucose and CT (PET/CT) is also a useful method for staging and assessment of the therapeutic response. Positive staining for leukocyte common antigen in histological specimen distinguishes malignant lymphoma from non-lymphoid neoplasm. However, diffuse large B-cell lymphomas are commonly positive for CD20 immunohistochemical stains.

The WHO modification of the revised European-American lymphoma classification recognizes three major categories of lymphoid malignancies as B-cell neoplasm, T-cell natural killer cell neoplasm, and Hodgkin’s lymphoma. The NHL can be divided into two prognostic groups: (1) Indolent NHL types have a relatively good prognosis, with median survival of 10 years, but they are not curable in advanced clinical stages\textsuperscript{49} and (2) the aggressive lymphomas have a poor prognosis, with a median survival of 2-3 years.

In general, the standard treatment for patients with diffuse large B-cell lymphoma is chemotherapy followed by involved field radiotherapy as this would prevent the spread of the disease and reduce the radiation field and radiation in most of the cases. RCHOP chemotherapy regimen is considered as a standard treatment for patients with advanced stage of diffuse large B-cell lymphoma.\textsuperscript{52}

**Rhinosporidiosis**

Rhinosporidiosis is a chronic and localized infection of the mucus membranes and the lesions present clinically as polypoid, soft masses (sometimes pedunculated) of the nose, throat, ear, and even the genitalia in both sexes. The presumed mode of infection from the natural aquatic habitat of \textit{Rhinosporidium seeberi} is through the traumatized epithelium “transepithelial infection” most commonly in nasal sites.\textsuperscript{53}

The etiological agent is \textit{R. seeberi}, the microbe has been considered a fungus by most microbiologists, although its taxonomy has been debated.\textsuperscript{54,55} The infectious agent forms round and thick-walled sporangia in the submucosa of the affected site, varying from 10 to 200 mm in size, which are visible as white dots in the mucosa containing smaller
“daughter cells” (called “sporangiospores”) (Figure 9).

It can be visualized with fungal stains such as Gomori methenamine silver and periodic acid-Schiff as well as with standard hematoxylin and eosin staining.

**Treatment**

The only curative approach is the surgical excision combined with electrocoagulation. Recurrence, dissemination in anatomically close sites, and local secondary bacterial infection are the most frequent complications.

**CONCLUSION**

This study mainly aims to enlighten the most interesting and rare presentations that can occur in the nasopharyngeal area along with the newer diagnostic and therapeutic advances. Squamous cell carcinoma, sinonasal undifferentiated carcinoma, extranodal NK/T-cell lymphoma, nasal type, rhabdomyosarcoma, Ewing/PNET, mucosal malignant melanoma, and neuroendocrine carcinomas could be the various differential diagnosis. An ENT surgeon has to keep an open mind to consider all these differential diagnosis in a case of nasopharyngeal mass. This will improve the accuracy of diagnosis and therapeutic outcome, especially in cases where early diagnosis can improve the chance of survival.

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