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Publishing Details
Publisher Name: International Research Organization for Life & Health Sciences (IROLHS)
Registered Office: L 214, Mega Center, Magarpatta, Pune - Solapur Road, Pune, Maharashtra, India – 411028. Contact Number: +919759370871.
Designed by: Tulyasys Technologies (www.tulyasys.com)

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The Correlation of Unilateral Chewing Habit with Temporomandibular Joint Disorders

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INTRODUCTION

Temporomandibular disorder (TMD) is a group of disorders in which exact etiology is still obscure¹ but it is considered multifactorial and includes both physical (peripheral) and psychosocial (central) factors.² There exists a correlation between impaired occlusion with musculoskeletal disturbances of the temporomandibular joint (TMJ).³ Mastication can take place bilaterally at the same time, on the right and left side alternately or consistently on one side, which is then referred to as laterality.⁴ As unilateral masticatory pattern is an expression of impaired function,⁵ it is of interest to find which features are exhibited by persons with unilateral or bilaterally chewing habit, how prevalent masticatory preference patterns are in the population and whether unilateral chewing, as a form of functional asymmetry is related to other functional or structural asymmetries. There have been very few studies to emphasize the above-mentioned features, and so this study aims to clarify the relationship between the oral habits and TMD signs and symptoms along with the contribution of partial edentulous arches and improper cervical posture in the development of TMD.

MATERIALS AND METHODS

Population and Sample

The study was conducted among the outpatient department (OPD) patients of a private institute of Navi Mumbai, for a time span of 2 months from October 2016 to November 2016. The patients were subjected to a questionnaire regarding the chewing habit (only >3 months were considered as unilateral chewers for the study), pain, sleeping position, history of joint pain and any systemic illness. Patients were checked for tenderness for bilateral TMJ, midline shift, mouth opening, and movements of TMJ. All patients were clinically examined using Type II American Diabetes Association type of examination. Before the start of the study, permission was taken from the respective Head of Departments. The study was cleared by the Institutional Ethical Committee by two...
independent reviewers who suggested few changes, and on resubmission, the clearance was obtained. Participants who gave voluntary informed consent were included in the study.

RESULTS

Our study comprised total 160 participants, who fulfilled our inclusion criteria from the OPD of a private institute in Navi Mumbai, Maharashtra, India. The study was conducted for a period of 2 months from the month October 2016 to November 2016.

The mean age of the study participants was 29.99 ± 10.549. There were 69 males (43.12%) and 91 females (56.8%) in the study.

Out of these 160 patients, 63 (39.3%) had bilateral chewing habit, and 97 (60.6%) had unilateral chewing habit. Based on the criteria mentioned in materials and methods, of the 97 with unilateral chewing, we found 56 (57.73%) were suffering from TMJ disorders, and 41 (42.2%) were not. This result was found to be highly significant ($P = 0.000$) (Table 1). Thereby we found a positive correlation in the development of TMD in unilateral chewers.

Of the 97 participants who showed unilateral chewing habit, 56 patients (57.7%) were actually suffering from TMD, and 41 patients (42.2%) were not. This was found to be highly significant ($P = 0.036$) (Table 1).

Out of 97 unilateral chewers, 55 patients (56.7%) were right sided of which 30 patients showed TMD and 42 patients (43.2%) were left sided of which 26 patients showed signs of TMD. Development of TMD was seen a maximum in right sided chewers. This was found to be nonsignificant ($P = 0.4593$).

A majority, i.e., 143 patients (89.4%) had undergone some form of dental treatment in the past, of which 25 patients (15.6%) had undergone orthodontic treatment.

Majority of patients 127 patients (79.4%) had the habit of sleeping on both sides left and right side, i.e., had no particular predominant side.

Majority of the patients (146 patients [91.3%]) did not have any adverse habits.

There was no history of any joint diseases in 149 patients (93.1%). There was no history of trauma in the patients except one whose mean trauma duration was 4.62 years ± 4.39.

Out of the 97 unilateral chewers, majority respondents, i.e., 62 patients (63.9%) had pain as the reason for unilateral chewing, and 55 patients (56%) had a reason of missing teeth. Out of the 56 patients who had TMD, the reason for unilateral chewing was found to be a pain in 36 patients.

On examining the patients, we found that 54 patients (96.4%) patients out of 56 patients who had TMD showed asynchronous movements and the result was highly significant ($P = 0.000$) (Table 2).

Of the 56 TMD patients, 54 (33.8%) had clicking of the TMJ of which 4 (25) had right side clicking, 12 (7.5) had left side clicking, and 38 (23.8%) had on both sides. Clicking was observed among 53 (94.6) out of 56 patients. This was found to be highly significant ($P = 0.000$) (Table 3).

Out of the 56 TMD patients only 9 patients had crepitus, 3 (1.9%) had right side, 2 (1.3%) on the left and 9 (5.6%) had on both sides, and 47(83.9%) did not show crepitus ($P = 0.000$) (Table 3).

A total of 55 patients had a deviation of the jaw while opening the mouth, of which almost equal prevalence of deviation to right 28 (50.9%) and left 27 (49.09%) sides was noted. Of 56 patients who showed clinical signs of TMD, 55 patients (98.2%) had a deviation, and 1 patient (1.8%) did not have deviation. This was found to be highly significant ($P = 0.000$) (Table 3).

Tenderness of TMJ was found in 10 patients (17.8%) out of the 56 patients who had TMD. Of 10 patients, 6 patients (10.7%) had all four muscles of mastication tender (Masseter, Temporalis, Lateral Pterygoid, Medial Pterygoid). 1 of 10 (1.78%) showed only tenderness of masseter muscle. Out of 10 patients, 1 each had tenderness

### Table 1: TMD and presence of unilateral chewing habit

<table>
<thead>
<tr>
<th>TMD</th>
<th>Presence of unilateral chewing habit</th>
<th>Absence of unilateral chewing habit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>56</td>
<td>0</td>
<td>56</td>
</tr>
<tr>
<td>Absent</td>
<td>41</td>
<td>63</td>
<td>104</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>63</td>
<td>160</td>
</tr>
</tbody>
</table>

*P value: 0.000, Z-score - 5.3666, presence and absence of unilateral chewing and bilateral chewing and TMD

### Table 2: TMD and presence of unilateral chewing habit

<table>
<thead>
<tr>
<th>TMD</th>
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<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>160</td>
</tr>
</tbody>
</table>

*The Z-score is 2.0894. The $P$ value is 0.036. The result is highly significant at $P<0.05$.

TMD: Temporomandibular disorder
of (1.78%) masseter muscle, (1.78%) temporalis, massetter and temporalis (1.78%) and 1 (1.78%) showed lateral pterygoid, and medial pterygoid tenderness. This was found to be highly significant ($P = 0.000$).

Out of the 56 unilateral TMD patients, we found 11 patients (19.64%) showing signs and symptoms of joint disease. This was found to be highly significant ($P = 0.000$). No joint disease was found in the 63 bilateral chewers.

On examining the midline shift, we noticed that out of 160 patients, 11 patients (6.875%) had midline shift, and all of these were unilateral chewers showing TMD disease. This was statistically found to be highly significant ($P = 0.000$).

**DISCUSSION**

The results of this study show that preferred unilateral chewing is present in more than half of the population. Based on the criteria mentioned in materials and methods, out of these 97, we found 56 patients were suffering from TMJ disorders, and 41 patients were not. This was found to be highly significant ($P = 0.000$), and thereby we found a marked positive correlation in the development of TMD in unilateral chewers. There have been studies that show a correlation between unilateral chewing habit and TMD.

Out of 97 unilateral chewers, 55 patients were right sided, and 30 of them showed TMD, and out of 42 patients who were left sided, 26 showed signs of TMD. Development of TMD was seen a maximum in right sided chewers, which was found to be nonsignificant in the study.

Among 97 patients who had unilateral chewing habit, the majority had the reason for unilateral chewing due to tooth pain. The other reasons for unilateral chewing were found to be missing teeth, loose teeth or just habitual. In our study, we found a tooth pain to be a major cause for unilateral chewing habit.

On examining the patients, we found a highly significant correlation between asynchronous movements of TMJ and TMD. Tenderness of muscles of mastication was found in 10 patients out of the 56 patients who had TMD, which was found to be highly significant. This finding supports similar report quoted in the textbook of Okeson kes oneness of TMDs and occlusion, which states the different etiological factors of TMD.

We found that out of all the patients having midline shift, all were unilateral chewers showing TMD disease and this was statistically found to be highly significant (0.000). Occasion has also reported the same finding. 54 patients out of 56 who had TMD showed asynchronous movements, and a highly significant association between asynchronous movements and TMD can be established.

We also observed a highly significant association of clicking and deviation of jaw with TMD.

**CONCLUSION**

With this study, we have found a high correlation between unilateral chewing habit and the development of TMJ disorders. The pain was found to be the most common cause for unilateral chewing, which emphasizes on how delay in dental treatment and negligence can result in
the development of TMD. If on primary examination itself a brief history of the chewing habit is taken, it may result in early diagnosis and intervention to eliminate the development of TMD. Similar studies have been reported but none on Navi Mumbai, Maharashtra, India population so far. An extensive study should be carried out in a larger sample size for a longer duration to throw more light and establish the relation between unilateral chewing and TMD.

REFERENCES


Source of Support: Nil. Conflict of Interest: None declared.
Evaluation of the Efficacy of Intrathecal Fentanyl Versus Intrathecal Nalbuphine as Adjuvants to 0.75% Ropivacaine for Post-operative Pain Relief in Cesarean Section: A Double-blind Randomized Comparative Study

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INTRODUCTION

Regional anesthesia is the anesthesia of choice which is being traditionally administered for cesarean section patients.1 Spinal anesthesia is safe, simple to perform, and also has many advantages such as intense analgesia, awake mother to permit bonding between mother and newborn. Nalbuphine is a mixed agonist–antagonist opioid and has a potential to attenuate the µ-opioid effects and to enhance the kappa-opioid effects. It produces desirable analgesia without causing the undesirable side effects of a mu agonist. Hence, the aim of this study is to compare the efficacy of intrathecal fentanyl versus intrathecal nalbuphine when added to isobaric ropivacaine for spinal anesthesia in cesarean section patients.

Abstract

Background: Spinal anesthesia is safe, simple to perform, and also has many advantages such as intense analgesia and awake mother to permit bonding between mother and the newborn. Nalbuphine is a mixed agonist–antagonist opioid and has a potential to attenuate the µ-opioid effects and to enhance the kappa-opioid effects. It produces desirable analgesia without causing the undesirable side effects of a mu agonist. Hence, the aim of this study is to compare the efficacy of intrathecal fentanyl versus intrathecal nalbuphine when added to isobaric ropivacaine for spinal anesthesia in cesarean section patients.

Aim: The aim of the study is to evaluate the efficacy of intrathecal fentanyl versus intrathecal nalbuphine as adjuvants to ropivacaine for post-operative pain relief in cesarean section patients.

Materials and Methods: After Institutional Ethics Committee approval and written informed consent, 50 pregnant females of ASA Grade II presented to Rangaraya Medical College for elective cesarean section were enrolled for this randomized, double-blinded comparative study. Group RF (n = 25) was given intrathecal injection of 2 ml isobaric 0.75% ropivacaine + 25 mg (0.5 ml) fentanyl (fentanyl 1 cc = 50 mg). Total volume made up to 2.5 ml. Group RN (n = 25) was given intrathecal injection of 2 ml of 0.75% isobaric bupivacaine + 1 mg (0.1 ml + 0.4cc NS) nalbuphine (nalbuphine 1 cc = 10 mg, 0.1 cc = 1 mg is made to 0.5 ml with normal saline) total volume made up to 2.5 ml. After performing the spinal injections, the following parameters were recorded. The onset times of sensory block to T8 and motor block (MBO) using pinprick and modified Bromage scale, respectively. Time to first request of analgesia, i.e., time from administering intrathecal drug to time at which the patient demands rescue analgesia for post-operative pain is defined as the duration of analgesia. Post-operative hemodynamics were recorded continuously. Level of consciousness, respiratory depression, and pulse oximetry were continuously monitored up to initial 24 hours post-operative period. The data were analyzed statistically.

Results: (1) Duration of sensory blockade was also significantly prolonged in RN group (RF vs. RN 180.75 ± 34.27 vs. 263.63 ± 44.88); P < 0.0186 was considered statistically significant, (2) the duration of motor blockade was significantly higher in nalbuphine group (RF vs. RN 148.13 ± 23.09 vs. 220 ± 34.59) P < 0.0002, (3) the time to first request of analgesia was significantly prolonged in nalbuphine group (RF vs. RN: 233.88 ± 36.82 vs. 312.38 ± 65.48); P < 0.01 was considered statistically significant.

Keywords: Fentanyl, Nalbuphine, Sensory blockade, Spinal anaesthesia
the newborn, allows early breastfeeding, early ambulation to the mother, and minimizes the incidence of deep vein thrombosis while avoiding all the complications of general anesthesia.2 Several adjuvants have been added to prolong the duration of single shot spinal anesthesia such as fentanyl, morphine, clonidine, dexmedetomidine, and adrenaline.3 Fentanyl is a lipophilic opioid with a rapid onset of action following intrathecal injection.4 It has been added to local anesthetics to improve the quality of blockade and also to prolong the duration of post-operative analgesia, which has been proved in many randomized clinical trials.

Nalbuphine is a mixed agonist–antagonist opioid and has a potential to attenuate the µ-opioid effects and to enhance the kappa-opioid effects.5 It produces desirable analgesia without causing the undesirable side effects of a µ agonist. It was used as an adjuvant to local anesthetics in many randomized clinical studies, especially in orthopedic procedures of lower limbs in doses between 0.2 and 2.4 mg in various studies.6,7 There are few studies, in which nalbuphine has been used as an adjuvant in cesarean section.8

Hence, the aim of this study is to compare the efficacy of intrathecal fentanyl versus intrathecal nalbuphine when added to isobaric ropivacaine for spinal anesthesia in cesarean section patients.

**MATERIALS AND METHODS**

After Institutional Ethics Committee approval and written informed consent, 50 pregnant females of ASA Grade II presented to Rangaraya Medical College for elective cesarean section were enrolled for this randomized, double-blinded comparative study.

**Inclusion Criteria**
1. Age: 18-25 years
2. Weight: 50-80 kg
3. Height: 150-170 cm
4. ASA: II

**Exclusion Criteria**
1. Patient refusal
2. History of any contraindication to spinal anesthesia
3. History of allergy to study drugs
4. Systemic disease complicating pregnancy
5. Pregnancy-induced hypertension or eclampsia.

The patients were divided into two groups of 25 each into group RF and RN; randomization was done using computer-generated random number table, three anesthesiologists were involved in the study. The anesthesiologist (b) who performed the spinal injections was unaware of the study drugs as the drugs were given to him or her in sealed envelope which were prepared by the principal investigator anesthesiologist (a). Monitoring and collection of data were done by another anesthesiologist (c).

Routine pre-operative investigations were performed in all patients including complete blood count, BT, CT, kidney function test, fasting blood sugar and random blood sugar, and electrocardiographic (ECG). Injection ranitidine 50 mg IM and injection metoclopramide 10 mg IV were administered to all patients 1 h before surgery.

Baseline parameters such as PR, noninvasive blood pressure (NIBP), RR, and SPO₂ were noted.

An 18G cannula was secured in the non-dominant hand. The patients were shifted to operating room in left lateral position. All the monitoring devices such as NIBP, pulse oximetry, and ECG were applied to the patients. Spinal injection is performed in the left lateral position under strict aseptic conditions with 25G Quincke Babcock needle at L₂/L₃ or L₃/L₄ interspace.

Group RF (n = 25) was given intrathecal injection of 2 ml 0.75% isobaric bupivacaine + 25 µg (0.5 ml) fentanyl (fentanyl 1 cc = 50 µg). Total volume made up to 2.5 ml.

Group RN (n = 25) was given intrathecal injection of 2 ml of 0.75% isobaric bupivacaine + 1 mg (0.1 ml + 0.4 cc NS) nalbuphine (nalbuphine 1 cc = 10 mg, 0.1 cc = 1 mg is made to 0.5 ml with normal saline) total volume made up to 2.5 ml.

After performing the spinal injections, the following parameters were (noted) recorded.

The onset times of sensory block to T₈ and motor block (MBO) to MB₂ using pinprick and modified Bromage scale, respectively. Maximum height (level) of sensory blockade and two-segment regression time were noted. Duration of sensory (T₉) and MBO were recorded. PR and blood pressures are monitored with non-invasive monitoring. PR and NIBP were monitored continuously every minute for initial 30 min after spinal anesthesia. Later PR and NIBP were monitored every 5 min until the end of surgery. Injection atropine 0.01 mg/kg iv was administered if PR <60/min. Injection ephedrine was administered in increments of 5 mg IV for hypotension (defined as >20% fall of BP from baseline).

Neonatal APGAR scores at 1 min and 5 min, respectively, were recorded.

Intraoperative complications such as hypotension, bradycardia, shivering, nausea, vomiting, and pruritus were recorded and appropriately managed.
Urinary retention was not a problem in these patients as urinary catheter was left in situ for 24 h.

Postoperatively, all these patients were assessed for pain using visual analog scale (VAS) until the first 24 post-operative hours. If VAS >4 rescue analgesia was administered in the post-operative period with injection diclofenac 75 mg IM and tramadol 1 mg/kg slow iv. Injection ondansetron 0.1 mg/kg IV was administered for nausea and vomiting. Injection chlorpheniramine maleate slow iv was administered for shivering.

Time to first request of analgesia, i.e., time from administering intrathecal drug to time at which the patient demands rescue analgesia for post-operative pain is defined as the duration of analgesia. Post-operative hemodynamics were recorded continuously. Level of consciousness, respiratory depression, and pulse oximetry were continuously monitored up to initial 24 h post-operative period. The data were analyzed statistically.

Statistical Analysis
Statistical analysis was done using the software GraphPad.com. Demographic data were analyzed using Fisher’s exact test. Comparison between sensory and motor blockade characteristics and duration of analgesia between the two groups was done using unpaired t-test. Categorical data were analyzed using Chi-square test. Data were expressed as a mean ± standard deviation, absolute numbers, and percentage. The data were considered statistically significant if \( P < 0.05 \).

RESULTS

- 50 ASA 1 and 2 pregnant parturients were included in this study.
- All the patients completed the study.
- All pregnant women were comparable with respect to demographic characters such as age, weight, height, gestational age, and duration of surgery. \( P > 0.005 \) was considered statistically not significant (Table 1).
- The onset time of sensory blockade was significantly earlier in fentanyl group (RF vs. RN: 2.50 ± 0.76 vs. 4.63 ± 1.19). \( P < 0.005 \) was considered statistically significant (Table 2).
- Two-segment regression time was prolonged in nalbuphine group (RF vs. RN: 120.88 ± 7.81 vs. 136.31 ± 6.15) \( P < 0.0007 \) was considered statistically highly significant (Table 2).
- Duration of sensory blockade was also significantly prolonged in RN group (RF vs. RN 180.75 ± 34.27 vs. 263.63 ± 44.88) \( P < 0.0186 \) was statistically significant (Table 3).
- The duration of motor blockade was significantly higher in nalbuphine group (RF vs. RN 148.13 ± 23.09 vs. 220 ± 34.59) \( P < 0.0002 \) was statistically highly significant (Table 3).
- The time to first request of analgesia was significantly prolonged in nalbuphine group. (RF vs. RN: 233.88 ± 36.82 vs. 312.38 ± 65.48) \( P < 0.01 \) was considered statistically significant (Table 4).
- Apgar scores were comparable between two groups at 1 and 5 min (Table 5).
- Side effects such as hypotension, nausea, vomiting,

### Table 1: Demographic data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group RF (n=25)</th>
<th>Group RN (n=25)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>22.25±2.38</td>
<td>22.00±3.12</td>
<td>0.859</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.38±5.63</td>
<td>155.50±5.66</td>
<td>0.1060</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>66.13±6.40</td>
<td>62.88±4.39</td>
<td>0.2560</td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>37.75±0.71</td>
<td>37.63±0.52</td>
<td>0.6927</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td>49.63±5.66</td>
<td>51.50±6.78</td>
<td>0.557</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD, absolute numbers and ratio, *P<0.05, not significant, Fisher’s Exact test

### Table 2: Sensory block characteristics

<table>
<thead>
<tr>
<th>Time in min</th>
<th>Group RF (n=25)</th>
<th>Group RN (n=25)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensory onset (min) to T10</td>
<td>2.50±0.76</td>
<td>4.63±1.19</td>
<td>0.0008**</td>
</tr>
<tr>
<td>Maximum height of block</td>
<td>5.50±0.76</td>
<td>5.50±1.07</td>
<td>1.000</td>
</tr>
<tr>
<td>2-segment regression time</td>
<td>120.88±7.81</td>
<td>136.31±6.15</td>
<td>0.0007</td>
</tr>
<tr>
<td>Duration of sensory blockade</td>
<td>180.75±34.27</td>
<td>263.63±44.88</td>
<td>0.0010**</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD, absolute numbers and ratio. **extremely statistically significant, *statistically significant, unpaired t-test

### Table 3: MBO characteristics

<table>
<thead>
<tr>
<th>Time in min</th>
<th>Group RF (n=25)</th>
<th>Group RN (n=25)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor onset (min) [MB2]</td>
<td>4.50±0.76</td>
<td>6.13±1.55</td>
<td>0.0186</td>
</tr>
<tr>
<td>Duration of motor blockade</td>
<td>148.13±23.09</td>
<td>220±34.59</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD, absolute numbers and ratio, *P<0.05, statistically significant, Unpaired t-test, MBO: Motor block

### Table 4: Mean duration of analgesia

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Group RF (n=25)</th>
<th>Group RN (n=25)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to 1st request of analgesia</td>
<td>233.88±36.82</td>
<td>312.38±65.48</td>
<td>0.0104*</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD, absolute numbers and ratio, *P<0.05, statistically significant, Unpaired t-test

### Table 5: Apgar scores

<table>
<thead>
<tr>
<th>Group</th>
<th>1 min median (range)</th>
<th>5 min median (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group RN</td>
<td>8 (8-10)</td>
<td>10 (10-10)</td>
</tr>
<tr>
<td>Group RF</td>
<td>8 (8-10)</td>
<td>10 (10-10)</td>
</tr>
</tbody>
</table>
and bradycardia were comparable between two groups. \((P > 0.005, \text{statistically not significant})\) (Tables 5 and 6).

- The incidences of pruritus and shivering were higher in fentanyl group than nalbuphine group, but statistically not significant \((P > 0.005)\) (Table 5).
- Intraoperative hemodynamics (systolic blood pressure) were comparable between two groups (Figure 1).

**DISCUSSION**

Neuraxial anesthesia is the choice of anesthesia in cesarean patients. The limitations of single shot spinal anesthesia are its short duration of action and the need to supplement with parental analgesics in the immediate post-operative period.\(^9\) Several intrathecal adjuvants have been used to improve the quality as well as prolong the duration of post-operative analgesia, of which opioids have been the gold standard agents.\(^10\) Morphine and fentanyl are the common agents used in several clinical trials because of their potency and other advantages. Emesis and pruritus have been the common side effects of neuraxial morphine.\(^11\)

The intrathecal use of fentanyl is limited by its brief prolongation of post-operative analgesia, i.e., between 2 and 4 h.\(^12\) Hence, the search for alternative opioid has led to the use of intrathecal nalbuphine as adjuvant to local anesthetics in various studies.\(^13\) Till date, there are very few studies which used nalbuphine as an intrathecal adjuvant.

In this study, intrathecal nalbuphine was compared with intrathecal fentanyl with isobaric bupivacaine as local anesthetic.

Nalbuphine is a synthetic agonist–antagonist opioid belonging to phenanthrene group. It is structurally related to naloxone, an antagonist of the opiate receptors and to oxymorphone, an analgesic agonist of opiate receptors.\(^14\)

Nalbuphine has been used as additive for spinal anesthesia in several clinical settings in doses ranging from 200 to 2100 mg. It is highly lipid-soluble opioid with agonist at kappa and antagonist at mu receptors. Hence, it provides potent analgesia at spinal level.\(^15\) The analgesic effects of spinal nalbuphine can be reverted by naloxone.

The onset times of sensory and MBO were earlier with fentanyl group when compared with nalbuphine group, in this study.

Intraoperative hemodynamics, quality of subarachnoid block, and oxygen saturation were comparable between both the groups.

The duration of sensory blockade was significantly higher in nalbuphine group as compared to fentanyl group. \(P < 0.05\) was considered highly significant (RF vs. RN: 180.75 ± 34.27 vs. 263.63 ± 44.88).

The duration of post-operative analgesia was significantly prolonged in the nalbuphine group when compared to fentanyl group. (RF vs. RN 233.88 ± 36.82 vs. 312.38 ± 65.48), \(P < 0.005\) was considered statistically significant.

Regarding side effects, there were no significant differences in the incidence of side effects such as nausea, vomiting, hypotension, and bradycardia.

Intraoperative shivering was significantly higher in the fentanyl group when compared to nalbuphine group. (RF vs. RN: 20% vs. 4%).

None of the patients in both the groups had respiratory depression and decreased oxygen saturation in the intra- and post-operative periods.

The mean fetal APGAR scores at 1 and 5 min intervals were between 8 and 10 in both the groups. The delivered fetuses are healthy and vigorous.

None of the patients had pruritus as a side effect in nalbuphine group.
The first study with intrathecal nalbuphine in obstetric patients was conducted by Culebras et al., in which they injected 200 µg, 800 µg, and 1600 µg mixed with hyperbaric 0.5% bupivacaine versus morphine 200 µg with bupivacaine in caesarean patients and concluded that 0.8 mg of nalbuphine produced analgesic duration comparable with 1.6 mg of nalbuphine without producing maternal or newborn respiratory depression. Overall, the duration of analgesia was significantly prolonged with 200 mg of intrathecal morphine in their study. Itching and post-operative nausea and vomiting were significantly greater with morphine in this study.

Yoon et al. found that an intrathecal mixture of nalbuphine 1000 µg, morphine 100 µg, and hyperbaric bupivacaine 10 mg for caesarean delivery intensified intraoperative analgesia compared to morphine alone. The combination of nalbuphine with morphine failed to prolong duration of post-operative analgesia significantly compared to morphine alone though there was no pruritus in the combination group.

Obara et al. evaluated the effects of intrathecal fentanyl added to hyperbaric bupivacaine for caesarean section and concluded that addition of intrathecal fentanyl to hyperbaric bupivacaine improved the quality without side effects.

Gomma et al. compared the effects of intrathecal nalbuphine and fentanyl when added to intrathecal bupivacaine for caesarean section. They concluded that the onset of times for sensory and MBO was significantly earlier in fentanyl group than in nalbuphine group. The duration of post-operative analgesia was more prolonged in nalbuphine group, but the difference was insignificant statistically. There was no significant difference between two groups with respect to sensory and MBO duration, hemodynamics, and adverse effects. The dose of nalbuphine used was 0.8 mg.

Mukherjee et al. evaluated intrathecal nalbuphine as an adjuvant to subarachnoid block with 0.5% hyperbaric bupivacaine in lower limb orthopedic surgeries and concluded that nalbuphine in a dose of 0.4 mg is a useful adjuvant for spinal anesthesia without increased side effects.

Ahluwalia et al. evaluated the effects of intrathecal nalbuphine in patients underwent lower abdominal surgeries under spinal anesthesia and concluded that the duration of analgesia was about 298.43 ± 30.92 min in nalbuphine + bupivacaine group compared to 201.31 ± 34.31 in the normal saline + bupivacaine group (P < 0.05) which was statistically significant. The dose of nalbuphine used in this study is 0.8 mg. The observations of our study correlated with the above studies. The difference was isobaric bupivacaine was used instead of hyperbaric bupivacaine. 0.75% ropivacaine was used in our study, whereas 0.5% bupivacaine was in our studies. Our study did not differ from the above studies with respect to quality of MBO though we have used isobaric bupivacaine as the local anesthetic. Surgeons’ satisfaction was adequate for all the cases regarding the quality of spinal blockade.

Yaksh and Bisnbaeh in their editorial titled as “intrathecal nalbuphine after caesarean delivery; Are we ready?” mentioned that the general trend of human studies on neuraxial nalbuphine is that epidural or intrathecal delivery of nalbuphine produces a significant analgesia accompanied by minimal pruritus and respiratory depression.

There are few studies with ropivacaine and nalbuphine, especially in pregnant women. The issue with intrathecal nalbuphine is regarding its neurotoxicity. None of the studies in humans done until now reported signs of neurotoxicity. None of the patients in this study also had reports of neurotoxicity in the perioperative period. Jyothi et al. have used intrathecal nalbuphine in doses of 0.8, 1.6, and 2.5 mg for lower abdomen and orthopedic surgeries also did not report any neurotoxicity signs. The duration of analgesia in this study was well correlated with our study. The difference is they did a controlled study and ours is a comparative study with fentanyl. Further research with this opioid is necessary to validate the results of the previous clinical trials.

We conclude that addition of intrathecal nalbuphine 1mg to isobaric 0.75% ropivacaine significantly prolonged the duration of post-operative analgesia when compared to intrathecal fentanyl 25 µg with minimal side effects. Intraoperative hemodynamics and quality of spinal blockade were comparable between the groups.

ACKNOWLEDGMENT

Authors thank the Department of Anaesthesiology, our Colleagues, and Students who have participated this study and enabled them to complete.

REFERENCES

Babu, et al.: Efficacy of Intrathecal Fentanyl versus Nalbuphine added to 0.75% Ropivacaine in Cesarean Section


How to cite this article: Babu KV, Kumar GP, Harinath G. Evaluation of the Efficacy of Intrathecal Fentanyl versus Intrathecal Nalbuphine as Adjuvants to 0.75% Ropivacaine for Post-operative Pain Relief in Cesarean Section: A Double-Blind Randomized Comparative Study. Int J Sci Stud 2017;5(1):5-10.

Source of Support: Nil, Conflict of Interest: None declared.
Analytical Study of Occult Spinal Dysraphism - Its Varied Presentations, Management and Outcome in South Indian Population

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Abstract

Introduction: Occult spinal dysraphism (OSD) represents a subset of spinal dysraphism in which the congenital defects are covered by intact skin. The risk of neurologic deterioration exists at all ages and increases with time and is frequently progressive. The detection and early treatment of such a subtle cutaneous anomaly in a child may be crucial to future neurologic, urologic, and orthopedic development.

Aim: To know demographics, presenting symptoms, clinical features, imaging, and surgical findings of the patients presented with OSD and to assess the outcome and to establish the necessity of surgery before the development of neurological deficits.

Methods: This study was conducted at Department of Neurosurgery, GRH, Madurai, during 2007-2011. A total of 50 patients presented with OSD were evaluated. Age, sex, presenting complaint, past history, cutaneous findings, neurological deficits, imaging findings, associated abnormalities, and outcome of surgery were assessed.

Results: Congenital dermal sinus was presented in 29 out of 50 patients (58%). The most common location of congenital dermal sinus tract in this study was lumbar region. The least common location of the sinus was at cervical region. 18 patients (36%) presented with neurological deficit. All patients had undergone surgical management with detethering. All patients were followed up at regular interval for 2-30 months. One patient developed recurrence of dermoid and another one showed deterioration of motor and autonomic deficits with the presence of pus in the tract. There were no symptoms of worsening or evidence of retethering in all other patients.

Conclusion: The presence of cutaneous stigmata over the midline neural axis should not be considered benign and must initiate prompt radiologic evaluation and neurosurgical referral. All patients with OSD should be offered aggressive surgical treatment.

Key words: Congenital dermal sinus, Dermoid, Detethering, Occult spinal dysraphism

INTRODUCTION

Occult spinal dysraphism (OSD) represents a subset of spinal dysraphism in which the congenital defects are covered by intact skin. Such anomalies united by similar embryological causes, common forms of presentation, and a propensity for multiple expressions within a single patient. These anomalies are numerous and include lipomyelomeningocele, hypertrophied lipomatous filum terminale, anterior and posterior meningoceles, myelocystoceles, split cord malformation, neuroenteric cysts, dermal inclusions, and terminal syringomyelia in addition to the ubiquitous sacral dimples.

The natural history of such abnormalities is variable and often unpredictable. Although some individuals remain asymptomatic throughout adulthood, others may develop progressive dysfunction of the lower limbs and bladder. The insidious fashion in which such complication develops may lead to irreversible damage to any symptomatic manifestation. The risk of neurologic deterioration exists at all ages and increases with time and is frequently progressive.
These syndromes are important for all physicians to recognize because early diagnosis and treatment can prevent sequelae of progressive neurological deficit. In this era of magnetic resonance imaging (MRI), asymptomatic OSD is recognized very early and presents a dilemma in the management. Prophylactic surgery has a high likelihood of changing the natural history in which a gradual loss of function may be replaced by clinical stability or improvement. The onset of signs and symptoms may be so gradual that a patient’s initial presentation to a neurosurgeon may not be until adulthood. The detection of such a subtle cutaneous anomaly in a child may be crucial to future neurologic, urologic, and orthopedic development. It is for all of these reasons that it behooves the neurosurgical community to be knowledgeable about this complex and fascinating group of problems.

**Aims and Objectives**

To know the demographics, presenting symptoms, clinical features, imaging, and surgical findings of the patients presented with OSD and to assess the outcome and to establish the necessity of early surgery before the development of neurological deficits.

**MATERIALS AND METHODS**

This study was conducted at the Department of Neurosurgery, GRH, Madurai, during 2007-2011. A total of 50 patients presented with OSD were evaluated. Age, sex, presenting complaint, past history, cutaneous findings, neurological deficits, imaging findings, associated abnormalities, and outcome of surgery were assessed. All patients had undergone surgical management with exploration, excision of cutaneous lesions such as skin tags, DST, dimples, intradural exploration of sinus tracts, dethering of the tethering, removal of associated abnormalities, and subjected to histopathological examination. Patients were followed up at regular intervals according to their post-operative status with particular care to the symptoms of retethering. Duration of follow up was 2-30 months.

**Statistical Methods**

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was performed with the help of computer using Epidemiological Information Package (EPI 2002). Using this software, range, frequencies, percentages, means, standard deviations, Chi-square and P values were calculated. Kruskal–Wallis Chi-square test was used to test the significance of the difference between quantitative variables and Yate’s test for qualitative variables. A P < 0.05 is taken to denote significant relationship.

**RESULTS**

A total of 50 patients with OSD who were evaluated and underwent surgical management during a period of 5 years, from 2007 to 2011 were included in this study. A total of 46 patients (92%) were seen in pediatric age group. Only four patients (8%) were seen in adult age group. There were 26 male and 20 female in pediatric age group. In adults, three were male and one was female (Table 1).

The M: F sex ratio in adult was 3:2 and in pediatric age group was 1:4:1. When both age groups were combined, the M: F ratio became 1:4:1. Lowest age in this group was a female child of 10 days old. A 27-year-old female was the one with the highest age, presented with congenital spinal dermal sinus. The median age of the patient with OSD in our study was 3 years.

Most of the patients presented had congenital dermal sinus (CST), and CST was presented in 29 out of 50 patients (58%). The most common location of congenital dermal sinus tract in this study was lumbar region. The least common location of the sinus was at cervical region. Sinus in dorsal location was seen in one adult male, one adult female, and three pediatric male patients.

Sinus in cervical location was seen in one male and three female patients of pediatric age group. Regarding the number of the sinuses, 30 sinuses were seen in 29 patients because one patient in pediatric age presented with two sinuses at different spinal levels. Two male patients in adult age group and eight patients (5 males and 3 females) in pediatric age group were presented with sinus in the lumbar region. Dermal sinus tract in the lumbarosacral region was seen in five female and four male patients of pediatric age group.

Twelve patients (48%) in this study came for their cutaneous manifestation only like sinus tract or hairy patch on their back.

Eighteen patients (36%) presented with neurological deficits in this study. Out of them, 17 patients belonged to pediatric age group. One adult who presented with the deficit was a female patient. Three patients presented with

**Table 1: Age wise incidence**

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>Cases</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>46</td>
<td>(92)</td>
</tr>
<tr>
<td>14 and above</td>
<td>4</td>
<td>(8)</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>(10)</td>
</tr>
<tr>
<td>Range</td>
<td>&lt;1 month - 27 years</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.2 years</td>
<td></td>
</tr>
</tbody>
</table>
the acute neurological deficit. Regarding the type of deficits, bladder, and bowel disturbances were common and seen in most of the patients presented with neurological deficits. Two patients presented only with autonomic disturbances. Two patients presented with radicular pain in the lower back. One adult male and one pediatric male patient came for pain around the sinus tract. One female patient in pediatric age came for restriction of neck movement only. Four patients came either for local infection or discharge from the sinus. There was no history of the previous surgery or exploration of tracts in any of the patients. Past history of episodes of meningitis was present in one patient (Figure 1).

We have noticed scoliosis in one female and four male in the adult group and one in pediatric group. Spina bifida was seen all except one adult male patient in patients with dermal sinus. Spina bifida was not localized to dermal sinus tract path. It was seen in adjacent levels in all patients. Spina bifida was the most common skeletal abnormality seen in this study. Scoliosis was seen in 5 dysplastic costal elements with hemi vertebrae were seen in three patients. Block vertebra and foot abnormality were not seen. Sacral agenesis of Pang type 3 was seen in one patient with Type 1 SCM (Table 2).

It was possible to demonstrate sinus tract in MRI in all patients. Tethering of spinal cord was seen in all patients.

**Therapeutic Approaches**

Good surgical planning is very important when evaluating these lesions. In the case of filum terminale dysgenesis, management principally involves division of the filum. The surgical approach generally involves exposure of the filum through a limited laminectomy at L5 to S1 although 15% of filum may fuse above S1 and 11% fuse off the midline.

A more generous exposure may be accompanied by a laminoplasty from L3 to L5. After exposure of the cauda equina, filum and the surrounding nerve roots are often easily identified. The filum may be truncated at a single location or at two separate points.

DST in the lumbar and lumbosacral region was always associated with low-lying conus in this study.

In this study, intramedullary dermoid was seen in five patients (10%) out of which four are seen in association with DST. Terminal syrinx was seen in six patients (12%). Neuroenteric cyst, SCM Type 1, anterior sacral meningoceles, and terminal lipoma were seen in one patient each. Brain screening did not demonstrate hydrocephalus in any of the patients.

Regarding cutaneous findings, the presence of simple dermal sinus was the manifestation in 29 patients. Swelling in the lumbosacral region was seen in 16 patients, and gluteal swelling was observed in one patient. Hypertrichosis was seen in 11 patients. Skin tag was seen in four patients. Dimples were seen in two patients. Surgery was done in all patients with intradural exploration. In DST, the presence of pus was demonstrated in three patients, and all of them were presented with acute neurological deficits. One patient presented with evidence of surrounding inflammation around dermal sinus. Intramedullary dermoid was an associated finding in two of these patients. Culture and sensitivity of pus revealed no growth. However, the anaerobic culture was not done in these patients. Near total improvement, partial improvement, and worsening were seen one in each, who presented with the acute deficit.

Those who presented with deficits (8 patients), near total recovery was seen in one, partial recovery was seen in two, and worsening of symptoms was seen in two patients. In three patients, there was no improvement of symptoms postoperatively. Four patients who had dermoid cysts were presented with deficits and one patient who had inclusion dermoid presented with low back and radicular pain. In this group near total recovery was observed in two patients and partial recovery, worsening and no improvement of symptoms was seen in one patient each. One patient developed post-operative CSF leak and wound infection which was treated successfully in a conservative manner. Excised specimens were subjected to histopathological examination, and the presence of stratified squamous epithelium lining the tract was confirmed in all DST.

<table>
<thead>
<tr>
<th>Table 2: Incidence of skeletal abnormalities</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCM</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Spina bifida</td>
<td>27 (54)</td>
</tr>
<tr>
<td>Block vertebra</td>
<td>Nil</td>
</tr>
<tr>
<td>Scoliosis</td>
<td>5 (10)</td>
</tr>
<tr>
<td>Costal dysplasia with hemi vertebrae</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Sacral agenesis</td>
<td>1 (4)</td>
</tr>
</tbody>
</table>
All patients were followed up at regular intervals according to their post-operative status (Table 3). One patient developed recurrence of dermoid and presented with paraparesis after improvement of deficits in initial surgery. There was no improvement after re-exploration and the patient lost for follow-up later. Another patient showed deterioration of motor and autonomic deficits who presented with the acute neurological deficit and the presence of pus in the tract and subarachnoid space. There were no symptoms of worsening or evidence of reethering in all other patients till date. The duration of follow-up was 2-30 months.

**DISCUSSION**

A total of 29 patients with congenital spinal dermal sinus treated in our department during the past 5 years were evaluated, and the factors such as age, sex, location of the sinus, presenting features, neurological deficits, cutaneous markers, MRI findings, intraoperative findings, and operative outcome of the patients were assessed. The findings of this study were compared with the study of Ackerman and Menezes, which reflects US scenario and with the study of Jindal and Mahapatra which reflects Indian scenario.

In our study, 84% (21/25) of patients were seen in pediatric age group as against 70% (16/23) in Mahapatra’s study and 86% (24/28) in Menezes’s study. A number of patients presenting in pediatric age group were more in all the three studies.

Regarding the location of the sinus (Table 4), the most common location was at the lumbar region in other two studies. In this study also, the sinus tract was most commonly encountered in the lumbar region. The least common location of the sinus was cervical region in all the three studies.

One of the patients in this study presented with dermal sinus at two different spinal levels (cervical and dorsal). Development of two DSTs at different spinal levels could be explained by multisite closure theory of Van Allen.

In all patients, DST was seen in midline except one where it was slightly off the midline on the right side in the lower lumbar region. DST with dual ostia was not seen in this study which was seen in one patient by Menezes. Development of dual ostia can be explained by recently proposed zipping error hypothesis.

Female patients were more common in other studies while male patients were more common in this study. Although most of spinal dysraphism conditions were commonly seen in females, the number of male patients with spinal dermal sinus was slightly higher in this study.

Cutaneous findings (48%) were the most common reason to seek medical attention which was also seen by Menezes (54%). However, the presence of neurological deficit was the common reason to come for clinic in Mahapatra’s series. Neurological deficits (32%) and local infection and discharge from the sinus (16%) were other frequent reasons in this study.

Incidence of neurological deficit was high in Mahapatra et al. (87%) as against 61% in Menezes et al. and 32% in this study. One of four adult patients (25%) and seven of 21 pediatric patients (33%) presented with deficits in this study. Menezes et al. and Mahapatra et al. also observed that deficits were common in pediatric age group. Although only 8 patients (28.5%) were referred for neurological deficits initially, Menezes subsequently found out neurological deficits in 17 (61%) patients. 8 patients (32%) in this study found to have neurological deficits. All of them had autonomic deficits. Regarding the type of deficits, autonomic deficits were common in our study in contrast to motor deficits observed in other series. Gait disturbances were seen in two patients.

When comparing age and sex with the presence of neurological deficit, there was no significant association. (Group A: Patients presenting with neurological deficits, Group B: Patients without neurological deficits) (Tables 5 and 6).

Bifid laminae were seen in all patients except one. Scoliosis was seen in four, another patient who had worsening of deficits developed scoliosis later. Dysplastic development of ribs with hemi vertebrae was seen in two patients who were not reported in other two series. Foot abnormalities were noticed in four patients by Menezes et al., three
patients by Mahapatra et al. In our study, no patients had foot abnormality (Table 4).

All patients were evaluated with MRI in this study and by Mahapatra et al. Only 24 patients out of 28 had MRI evaluation in Menezes et al.

All patients were found to have tethered cord in this study as against 22/28 (78.5%) by Menezes et al. One patient with terminal lipoma was seen. Dermoid was seen in 4 (16%) of patients. Three patients had intramedullary dermoid at dorsal level inclusive of the patient with double dermal sinus who also had extramedullary dermoid in cervical region. Another patient had extramedullary dermoid in the lumbar region. Abscess formation in intramedullary dermoid was seen in one patient. Epidermoids and hydrocephalus were not encountered in any of the patients. Terminal syrinx was seen in three patients in this study (Table 7).

When applying a statistical test to good (intact and improved) and poor (not improved and worsened) outcome groups, the P value is 0.0004. Since, the P value is significant (<0.05), it is evident that patients without deficit at presentation have a better prognosis than the patients with deficit.

When the outcome was compared between this study and Menezes et al. (P = 0.5586), it yielded insignificant value. Hence, there is no difference in outcome between Menezes et al. and our study. When outcome was compared with Mahapatra et al. (P = 0.0427), it yielded significant value. Hence, the outcome in this study is better than in Mahapatra et al. This may be due to a large number of patients presented with neurological deficits in Mahapatra et al. series. Hence, for a good outcome, surgery is warranted before the onset of neurological deficit (Tables 8 and 9).

**CONCLUSION**

The presence of cutaneous stigmata over the midline neural axis should not be considered benign and must initiate prompt radiologic evaluation and neurosurgical referral. All patients with OSD should be offered aggressive surgical treatment in the form of total excision of cutaneous lesions like dermal sinuses, detethering of tethering elements and correction of associated abnormalities as soon as diagnosed. Chance of preserving and/or improving the neural function is high when surgical intervention is done before the onset of gross neurological deficits.

<table>
<thead>
<tr>
<th>Table 5: Age difference between groups</th>
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<tbody>
<tr>
<td>Age Group A</td>
</tr>
<tr>
<td>Range 1.5-27 years</td>
</tr>
<tr>
<td>Mean 6.5 years</td>
</tr>
<tr>
<td>SD 8.4 years</td>
</tr>
<tr>
<td>P 0.1988</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 6: Sex difference between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Group A (8)</td>
</tr>
<tr>
<td>Male 6 (75)</td>
</tr>
<tr>
<td>Female 2 (25)</td>
</tr>
<tr>
<td>Total 8 (100)</td>
</tr>
<tr>
<td>P 0.2337</td>
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</tbody>
</table>

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<tr>
<th>Table 7: Associated abnormalities</th>
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<tbody>
<tr>
<td>Associated abnormalities</td>
</tr>
<tr>
<td>Dermoid 3</td>
</tr>
<tr>
<td>Epidermoid -</td>
</tr>
<tr>
<td>Epidermal and endodermal cyst 2</td>
</tr>
<tr>
<td>SCM 3</td>
</tr>
<tr>
<td>Terminal syrinx -</td>
</tr>
<tr>
<td>Neuroenteric cyst -</td>
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<tr>
<th>Table 8: Outcome comparison</th>
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<tbody>
<tr>
<td>Outcome</td>
</tr>
<tr>
<td>Group A (8)</td>
</tr>
<tr>
<td>Improved 3 (37.5)</td>
</tr>
<tr>
<td>Not improved 3 (37.5)</td>
</tr>
<tr>
<td>Worsened 2 (25)</td>
</tr>
<tr>
<td>Intact -</td>
</tr>
<tr>
<td>Total 8 (100)</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 9: Outcome comparison with other studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
</tr>
<tr>
<td>Neurologically intact pre- and post-operative 11 (39)</td>
</tr>
<tr>
<td>Neurologically improved 12 (43)</td>
</tr>
<tr>
<td>Post-operative</td>
</tr>
<tr>
<td>Neurologically worsened 3 (11)</td>
</tr>
<tr>
<td>Neurologically unchanged 2 (7)</td>
</tr>
</tbody>
</table>

This is important for clinicians to be able to distinguish between the benign coccygeal pits and the potentially more ominous DSTs. Timely, definitive operative intervention with intradural exploration can preserve or improve neurologic function for many in this patient population. The risks associated with surgical exploration are very low and the benefit is high. There
is no justification for a conservative approach as such a therapy entails the risk of the development of progressive or sometimes acute neurological deficit. Skeletal abnormalities may also occur in the form of neurogenic scoliosis.

A high index of suspicion is required for diagnosing OSDs. MRI is the investigation of choice. Intradural exploration is the most important part of surgical management. Associated pathologies are common and should be dealt appropriately. Outcome is directly related to the pre-operative neurological status which further reiterates the importance of early diagnosis.

ACKNOWLEDGMENTS

I take this opportunity to thank and honor a host of well-intended individuals who helped me in completion of this voluminous and arduous task. At the very outset, I express my sincere gratitude to my professors and colleagues, Department of Neurosurgery, Government Rajaji Hospital, Madurai, for their great kindness, inspiration and valuable suggestion throughout the period of my dissertation. I would like to extend my thanks to my family and to paramedical staff in assisting me in every way during this study.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Role of High-resolution Computed Tomography in the Evaluation of Temporal Bone Fracture

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INTRODUCTION

Head injury is one among the common killers in modern day road traffic accidents (RTA), and young adults are the most common victims.¹ Skull base and temporal bone fractures are frequently associated with severe high-velocity head trauma. Most common sensory organ injured is ear.² Because of the seriousness and immediate care needed for the associated major brain parenchymal injuries, these fractures are often overlooked.³,⁴

Temporal bone is one among the complex bones in the human body. Apart from protecting the brain by bordering middle and posterior cranial fossae, it contains various important organs such as middle and inner ear cavity with its contents, 7th and 8th cranial nerves, internal carotid artery, and jugular vein.

Even though most of these fractures are not life-threatening, they are often associated with severe morbidity which has got a major impact on the quality of life and also requires prolonged rehabilitation.

Routine practice in head injury is to have a conventional computed tomography (CT) of the brain and bone window in axial sections and treat accordingly. This conventional CT has got its own limitations and often missed finer details of the temporal bone fractures. Hence, it is imperative to include high-resolution CT (HRCT) in the armamentarium of the investigations for head injury.

Abstract

Introduction: Skull base and temporal bone fractures are frequently associated with severe high-velocity head trauma. Even though most of these fractures are not life-threatening, they are often associated with severe morbidity which has got a major impact on the quality of life. Conventional computed tomography (CT) has got its own limitations and often missed finer details of the temporal bone fractures. Hence, it is imperative to include high-resolution CT (HRCT) in the armamentarium of the investigations for head injury.

Aim: This study aims to define the diagnostic value of the HRCT in temporal bone fractures and also to highlight the superiority of HRCT over conventional CT in defining the extent of the fracture.

Materials and Methods: This study involved patients with head injury who had been admitted to Government Rajaji Hospital, Madurai Medical College, irrespective of age/Glasgow coma scale score with symptoms/signs suspicious of temporal bone fracture. All patients were underwent both conventional and HRCT. The difference in the rate of detection of temporal bone fractures in both the techniques was compared and analyzed.

Results: Among the total of 60 enrolled patients, 20 patients were not having temporal bone fractures. Of the remaining 40 patients, conventional CT can pick up only 15 fractures. However, HRCT diagnosed temporal bone fractures in all 40 patients. We have found statistically significant difference in fracture detection rate between HRCT and conventional CT.

Conclusion: HRCT of temporal bone is more sensitive and specific than conventional CT in diagnosing temporal bone trauma. HRCT is highly efficient in assessing the extent of the fracture line in temporal bone trauma.

Key words: Head injury, High-resolution computed tomography, Temporal bone
of the investigations for head injury. There is no clear consensus about to whom this HRCT is needed.

Aims and Objectives
The objective of this study is to define the diagnostic value of the HRCT in temporal bone fractures and to highlight the superiority of HRCT in defining the extent of the fracture.

MATERIALS AND METHODS

In this prospective study, we enrolled patients with head injury who had been admitted in head injury ward at Government Rajaji Hospital, Madurai Medical College, from February 2012 to February 2013 (Table 1). After obtaining informed written consent from the patient/patient’s reliable attender, all patients are enrolled and studied as soon after admission to emergency department as possible.

Inclusion Criteria
All patients admitted with head injury, irrespective of age/Glasgow coma scale (GCS) score with symptoms/signs suspicious of temporal bone fracture such as:
• Ear bleeding
• Hearing loss
• Cerebrospinal fluid (CSF) otorrhea
• Facial nerve weakness.

As the aim of this study is to define the importance of HRCT, we have included all head injured patients not taking the age, mode of injury, and GCS into consideration.

Exclusion Criteria
• Those who had traumatic head injury that required emergency surgical intervention
• Images degraded by motion artifacts
• Those patients who were not willing to participate in this study.

Image Acquisition
All patients were subjected to:
• Conventional CT with bone window in axial section (10 mm axial sections with 9 s scan time)
• HRCT of temporal bones with axial and coronal reconstruction (1.5 mm sections with exposure factor of 120 kVp and 200-500 mAs).

Image Analysis
All images were analyzed to detect the presence of temporal bone fractures by an attending neuroradiologist and neurosurgeon, in which the former was blinded to the clinical condition of the patient.

Images were evaluated for:
• Whether fracture of temporal bone is present or not
• If present, the part of temporal bone affected (squama/petrous/mastoid/tympanic/styloid)
• In petrous fractures, the type of fracture (longitudinal/transverse/oblique)
• Extent of the fracture line into cochlea, semicircular canal, vestibule, ossicular chain, tegmen, carotid canal, foramen ovale, internal auditory canal, jugular foramen, sigmoid sinus.

Statistical Methods
Computer analysis of statistical data was done utilizing the “N–1” Chi-square-test.

RESULTS

Among the total of 60 enrolled patients, 20 patients were not having temporal bone fractures. That means, even those patients with clinical suspicion of temporal bone trauma, 33.3% of them may not have fractures in imaging studies. Of the remaining 40 patients, conventional CT can pick up only 15 fractures. However, HRCT diagnosed temporal bone fractures in all 40 patients. We have found statistically significant difference in fracture detection rate between HRCT and conventional CT. Statistical analysis by the “N–1” Chi-square-test revealed

$$\chi^2 = 9.83$$

and

$$P = 0.0017$$.

By conventional criteria, this difference is considered to be statistically significant (Table 2).

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>37.7 years</td>
<td>14-75 years</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>14</td>
</tr>
<tr>
<td>GCS score</td>
<td>13</td>
<td>7-15</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ear bleeding</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Hearing loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conductive</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Sensorineural</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>CSF otorrhea</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Facial nerve weakness</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

GCS: Glasgow coma scale, CSF: Cerebro spinal fluid

<table>
<thead>
<tr>
<th>Table 2: HRCT versus conventional CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional CT finding</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Conventional CT (fracture positive)</td>
</tr>
<tr>
<td>Conventional CT (fracture negative)</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*N–1* Chi-squared test: $$\chi^2 = 9.83$$, $$P = 0.0017$$, HRCT: High-resolution computed tomography, CT: Computed tomography
Among the total of 60 patients, 46 male and 14 female patients were randomly selected for the study. The incidence of fracture was not having any preponderance toward a particular gender.

There was no statistically significant relationship between GCS and the presence of fracture. Although there were more number of RTAs victims had fracture of temporal bone, it was only because of increased percentage of RTA victims included in this study. There was no statistically significant association between mode of injury and presence of fracture.

We have found significant proportion of patients with CSF otorrhea and facial nerve injury were having high chance of temporal bone fracture, even though the number is smaller. In our study, all 3 facial nerve injuries were associated with mastoid part of temporal bone fracture (Table 3).

The most common location of fracture in the temporal bone was petrous part, followed by squamous part. There was no case of styloid fracture in our study. The most common type of fracture was longitudinal which constituted 80% in our series. Longitudinal type of petrous bone fractures was frequently associated with conductive hearing loss, accounting for 62.5%. However, sensorineural deafness was commonly seen with transverse fractures, about 50%. Two patients with squamous fracture and one patient with mastoid fracture had conductive type of hearing loss.

One out of two patients with transverse and oblique fractures had facial nerve involvement. None of the longitudinal groups had facial nerve injury. We found all the 4 patients who sustained transverse and oblique fractures had CSF otorrhea. Only 37.5% of longitudinal group had otorrhea.

Table 4 is showing the value of HRCT in depicting the fracture line clearly and in showing the involvement of important adjacent structures also. Conventional CT in our study was not able to pick up any of these details.

**DISCUSSION**

The symptoms of temporal bone trauma are unique in that most often the diagnosis depends heavily on symptoms. However, relied entirely on symptomatology can miss a considerable amount of significant temporal bone fractures. According to a study by Waldron and Hurley, in spite of full detailed clinical examination, 8 cases were missed, and 5 of them developed complications of temporal bone fractures. This was a significant number of false negativity. In our study, we were not analyzing in that aspect of symptomatology. Our analysis was entirely different. We have taken those patients who had symptoms highly suspicious of temporal bone fracture. Ear bleeding was the most common symptom in our study which had 57.8% yield of fracture positivity. Hearing loss had 62.5% and 40% positivity for conductive and sensorineural loss, respectively. However, traumatic facial nerve injury had 100% positivity rate, followed by CSF otorrhea which had 80% positivity. One limitation in this aspect is a smaller number of patients with these latter two symptoms.

Regarding the mode of injury, motor vehicle accidents are the most often implicated mode for temporal bone trauma (Patel et al.). In our study also, RTAs was the most common mode of trauma causing temporal bone injury, accounting for 75% of fracture cases, followed by accidental fall contributing 15% of cases. Gunshot injuries, in contrary to the international studies, were rarely observed in our population. Penetrating temporal bone injuries were commonly observed in assault cases. In our study, all 3 assault cases were associated with penetrating trauma to the temporal bone. However, the type and part of temporal bone fracture were not influenced by the mode of injury.

On gender difference, even though the incidence of temporal bone fracture was higher in male patients in this study, it was only because of increased number of male patients participated in the study when compare to female patients. In our study, male:female ratio was 4:1. Whether the gender difference in the thickness of skull has any
impact on this gender difference of temporal bone fracture was not studied here.

Regarding the GCS score, those patients with moderate to severe head injury (moderate - GCS 9-13 [82.1%], severe - 3-8 [100%]) had high chance of temporal bone trauma. However, in this aspect of analysis, this difference was not statistically significant.

In imaging the temporal bone in trauma, plain X-ray was previously used. The study by Waldron and Hurley showed a significant false negative rate in detecting temporal bone fractures with plain radiograph and symptomatology alone. The role of HRCT in detecting temporal bone trauma is undoubtedly established by various studies. However, there is no clear consensus about to whom this modality is indicated because performing HRCT in all head injured patients is cumbersome in population like ours.

HRCT has got a role not only in diagnosis but also in accurately delineating the finer details of fracture line. The study conducted by Holland and Brant-Zawadzki showed that HRCT images are taken more efficiently and with minimal radiation, and reformation in multiple projections regardless of the original scanning plane. Delineation of more subtle fractures of the petrous bone and thorough evaluation of associated findings is possible with HRCT. And also, the three dimensional capability of HRCT offers a specific advantage over conventional CT.

HRCT is initially taken in axial section and then coronal, and sagittal reconstruction is carried out with specific software which allows maximum flexibility in detailing the course of fracture line. A valuable advantage is for those structures which are vertically oriented (descending part of facial canal). Furthermore, dynamic sequential scanning and low-milli ampere-second technique allows rapid imaging and minimizing the radiation exposure.

Contrary to high-resolution scanning, conventional CT (10 mm slices) is inefficient in diagnostic as well as for screening purposes. In our study, conventional CT diagnosed only 15 cases of temporal bone injury out of total 40 cases which were diagnosed by HRCT. However, this routine conventional tomography could be able to give clues such as opacification of mastoid air cells, intracranial air pockets, etc.

Analyzing the site of fractures in temporal bone, petrous part was the most frequently injured, followed closely by squamous part. We found that petrous fractures accounted 50% and that of squamous was 32.5% in total number of 40 temporal bone fractures. Mastoid part was involved in 7.5% of cases and tympanic part in 2.5% (only one case).

Among the petrous bone fractures, longitudinal type of fractures which runs along the long axis of petrous bone was the most common type, constituting 80% of the cases. Hearing loss frequently seen in this type of fracture was conductive hearing loss which was 62.5% and rarely causing sensorineural hearing loss, constituting only 15%. Facial nerve injury was not seen in this type of fractures. CSF otorrhea was seen in 37.5% of longitudinal fractures.

Transverse fractures which run right angle to the petrous axis were seen in 10% and oblique type in 10% of cases. Sensorineural type of hearing loss was the most frequent type seen in these fractures, accounting for 50% of transverse fractures. Facial nerve involvement observed in 50% of cases and CSF otorrhea also seen in 50% of these fractures. These results are paralleling the international studies. A similar sort of study was done by Holland and Brant-Zawadzki also showed results similar to our study.

Apart from categorizing the fracture types, HRCT has got a major role in precise and complete delineation of fracture line. For those patients who need surgical intervention for any of the complications of temporal bone injury, pre-operative HRCT is definitely needed to plan the surgical approach. In our study, HRCT showed ossicular chain disruption in 8 cases, tegmen involvement in 4 cases, vestibular injury in 4 cases, cochlear damage in 3 cases, and semicircular canal injury in 2 cases. However, none of these details about the extent of fracture line was seen in conventional CT.

The importance of early identification of these temporal bone injuries and their detailed description avoids some of the delayed complications of these injuries which may have a strong impact on the quality of life and sometimes may cause mortality also. Those complications are delayed facial nerve palsy, delayed CSF leak, and meningitis.

**SUMMARY**

This is a prospective study involving patients with head injury who had been admitted in Head injury ward at Government Rajaji Hospital, Madurai Medical College, from February 2012 to February 2013. All patients who had symptoms/signs suspicious of temporal bone fracture such as ear bleeding, hearing loss, CSF otorrhea, facial nerve weakness were included in this study. All patients were subjected to both conventional CT with bone window and HRCT of temporal bones with axial and coronal reconstruction. Among the total of 60 enrolled patients, 20 patients were not having temporal bone fractures. Of the remaining 40 patients, conventional CT can pick up only 15 fractures. However, HRCT diagnosed temporal...
bone fractures in all 40 patients which are a statistically significant difference.

HRCT of temporal bone is more sensitive and specific than conventional CT in diagnosing temporal bone trauma and also HRCT is highly efficient in assessing the extent of the fracture line in temporal bone trauma. Hence, it is the must to include HRCT in the evaluation of patients with head injury who are having risk factors for temporal bone fracture.

ACKNOWLEDGMENT

I take this opportunity to thank and honor a host of well-intended individuals who helped me in completion of this voluminous and arduous task.

At the very outset, I express my sincere gratitude to Professor N. Muthukumar, Professor and Head of the Department of Neurosurgery, Government Rajaji Hospital, Madurai, for his great kindness, inspiration and valuable suggestion throughout the period of my dissertation.

I am extremely grateful to Professor Sundararajan and Professor R. Veerapandian for their academic assistance and consistent encouragement. I am indebted to the sincere compliments and enthusiasm rendered by all my assistant professors of the Department of Neurosurgery.

My immense thanks are due to Dr. N. Sundari, Professor and Head of the Department of Radiology, Government Rajaji Hospital, Madurai. I hereby thank the Dean of Madurai Medical College, for allowing me to use the college and hospital facilities during my study. I thank my colleagues, family friends, and well-wishers for their unequivocal support they gave me during this process. I owe my prayers to The Lord, who gave me the inner strength to complete this work.

REFERENCES

13. Kettel K. Peripheral facial paralysis in fractures of the temporal bone; indications for surgical repair of the nerve; report of cases in which the balance and duel operation was used. Arch Otolaryngol 1950;51:23-41.


Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study of the Effect of Buprenorphine and Fentanyl as an Adjunct to Bupivacaine in Epidural Anesthesia for Lower Abdominal and Lower Limb Surgeries

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Abstract

Introduction: Central neuraxial opioids' administration has opened a new horizon in pain management in perioperative period. Buprenorphine, an agonist - antagonist is thirty times more potent than morphine and with lipid solubility about 5 times greater than that of morphine. Fentanyl, a short-acting agonist, acts at µ receptor which is 100 times more potent than morphine.

Aim: The aim of this study was to compare the effect of buprenorphine and fentanyl as an adjunct to 0.5% bupivacaine in epidural anesthesia for lower abdominal surgeries and lower limb surgeries.

Materials and Methods: This is a randomized clinical study conducted at a tertiary care center. A total of 60 patients posted for elective lower abdominal surgeries were divided into two groups of 30 each. Group A received 0.5% bupivacaine 14-20 ml in the doses of 1.5 mg/kg with 300 µg buprenorphine and Group B received 0.5% bupivacaine 14-20 ml in the doses of 1.5 mg/kg with 50 µg fentanyl.

Results: Both the groups maintained hemodynamic stability which was statistically insignificant. Onset of sensory block and mean time to achieve motor blockade were same in both groups. Duration of analgesia was significantly prolonged in Group A (766.6 min) when compared to Group B (471 min) with significant (P < 0.05).

Conclusion: We observed that the postoperative analgesia was definitely of a longer duration with the buprenorphine group when compared to fentanyl group. Hence, it is concluded that epidural buprenorphine is better in providing prolonged satisfactory postoperative analgesia as compared to fentanyl when it is used as adjuncts with bupivacaine.

Key words: Epidural anesthesia, Fentanyl, Buprenorphine, Post-operative analgesia

INTRODUCTION

Epidural anesthesia is one of the best accepted techniques for lower abdominal surgeries as it provides good sensory and motor block with contracted bowels, retaining spontaneous respiration, hemodynamic stability, and also an indwelling catheter which facilitates further administration of analgesic drugs for the postoperative period. Epidural and intrathecal opioids have gained significance in the past three decades. The side effects of opioids were mostly seen with morphine due to its hydrophilic nature and its rostral spread.

Buprenorphine is semisynthetic, highly lipophilic opioids derived from the Baine in 1966 and is 33 times more potent than morphine. It acts as narcotic agonist (at lower doses) and antagonist (at higher doses) in doses varying from 60 to 300 µg have been used for epidural administration for postoperative pain relief.

Fentanyl, a synthetic opioid, a tertiary amine, and a phenyl piperidine derivative, was first synthesized by Dr. Paul
Dhakshinamoorth, et al.: A Comparative Study of the Effect of Buprenorphine and Fentanyl as an Adjunct to Bupivacaine in Epidural Anesthesia for Lower Abdominal and Lower Limb Surgeries

Jannsen in 1960. It is available as an injection, transdermal patches, and lollipop.

**Aim**
In this context, the present study was undertaken to compare the effect of buprenorphine and fentanyl as an adjuncts to 0.5% bupivacaine for epidural anesthesia in lower abdominal surgeries and lower limb surgeries in providing, (1) Intraoperative good sensory and motor blockade, (2) quality and duration of postoperative analgesia, (3) changes in hemodynamic and respiratory parameters, and (4) to study the side effects such as nausea, vomiting, respiratory depression, urinary retention, pruritus, and others if any.

**MATERIALS AND METHODS**

This is a randomized clinical study conducted in the Department of Anesthesiology, Rajah Muthiah Medical College and Hospital, Chidambaram, during 2015-2016, after getting approval from the Institutional Ethical Committee. The study was conducted on a total of 60 adult patients of either sex, aged between 20 and 60 years, belonging to either ASA Class I or II, posted for elective surgery. Patients were excluded when they refused or if they had any spinal deformity, neurological deficit, or local sepsis in the site of needle insertion. A detailed preanesthetic checkup was done for all patients and informed consent with prior explanation of the procedure to them was taken.

Patients were randomly assigned to any one of the groups with 30 patients each in each group.

In the operating room, an intravenous (IV) line was secured with and IV fluid connected. Monitors including noninvasive blood pressure, electrocardiogram, and pulse oximeter were connected and pre-operative baseline blood pressure, heart rate, and oxygen saturation were recorded.

Patients in lateral position with a small pillow under the head, local infiltration was done after thorough aseptic preparation of needle insertion site. Epidural space was found using a 16 G Tuohy needle at L2-L3 interspaces using loss of resistance technique. Epidural catheter was then threaded through this needle for 5-6 cm in the cephalad direction and was properly fixed after removing the needle. After giving the epidural test dose with negative signs of intravascular or subarachnoid injection, the full test drug was given through the epidural catheter.

The drug was injected approximately at the rate of 1 ml/s and level of the block was determined by loss of sensation to pin prick. The spread was considered to be complete when two identical dermatomes on both sides were insensitive. Heart rate, blood pressure, oxygen saturation, and respiratory rate were recorded for every 5 min for the first 15 min and every 15 min thereafter for the first 3 h.

After the completion of surgery, the patients were observed in the recovery room. The duration of analgesia was measured from time of first administration of the epidural drug till the time when the patient complaint of pain of more than 5 cm on the visual analog scale and the rescue analgesic was administered.

The onset of surgical analgesia to achieve the highest grade of motor block was recorded and was graded according to modified Bromage scale.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Free movements of legs and feet with ability to raise extended leg</td>
</tr>
<tr>
<td>1</td>
<td>Decreased knee flexion, inability to raise extended leg with full flexion of feet and ankles</td>
</tr>
<tr>
<td>2</td>
<td>Inability to raise legs or flex knees but with flexion of ankles and feet</td>
</tr>
<tr>
<td>3</td>
<td>Inability to raise legs, flex knees or ankle or move toes</td>
</tr>
</tbody>
</table>

Side effects such as nausea, vomiting, hypotension, respiratory depression, pruritus, and allergic reaction were looked and were recorded if any.

**OBSERVATIONS AND RESULTS**

A total of 60 patients of either sex participated in the study. Statistical data were analyzed using
- Chi-square-test
- Student t-test (paired and unpaired t-test)
- \( P < 0.05 \) - significant, \( <0.01 \) - highly significant, \( <0.001 \) - very highly significant, and \( >0.05 \) not significant.

**Demographic Data Analysis**

Table 1 shows Group A: 0.5% bupivacaine with 300 µg of buprenorphine.

Table 2 shows Group B: 0.5% bupivacaine with 50 µg of fentanyl.

**Sensory Block**
It was observed that the onset of analgesia in Group A was 7.56 min when compared to Group B which was 6.6 min, which is statistically significant \( (P > 0.05) \). It shows that there was no difference in the onset of action (Table 3 and Graph 1).

<table>
<thead>
<tr>
<th>Group A</th>
<th>30 patients</th>
<th>0.5% bupivacaine 14-20 ml in the doses of 1.5 mg/kg with 300 µg buprenorphine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.5% bupivacaine 14-20 ml in the doses of 1.5 mg/kg with 50 µg fentanyl</td>
</tr>
</tbody>
</table>
Dhakshinamoorth, et al.: A Comparative Study of the Effect of Buprenorphine and Fentanyl as an Adjunct to Bupivacaine in Epidural Anesthesia for Lower Abdominal and Lower Limb Surgeries

Table 1: Group A - 0.5% bupivacaine with 300 µg of buprenorphine

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Number of male patients</th>
<th>Number of female patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>22-58</td>
<td>46-72</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Mean</td>
<td>43.77</td>
<td>57.90</td>
<td>36.7</td>
<td>63.3</td>
</tr>
</tbody>
</table>

Table 2: Group B - 0.5% bupivacaine with 50 µg of fentanyl

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Number of male patients</th>
<th>Number of female patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>26-59</td>
<td>45-74</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>Mean</td>
<td>39.43</td>
<td>56.56</td>
<td>56.7</td>
<td>43.3</td>
</tr>
</tbody>
</table>

Table 3: Sensory block

<table>
<thead>
<tr>
<th>Dermatome level</th>
<th>Group A (min)</th>
<th>SD</th>
<th>Group B (min)</th>
<th>SD</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁₂</td>
<td>7.56</td>
<td>3.11</td>
<td>6.66</td>
<td>2.44</td>
<td>1.246</td>
<td>P&gt;0.05 (Not significant)</td>
</tr>
<tr>
<td>T₁₀</td>
<td>11.06</td>
<td>3.08</td>
<td>10.20</td>
<td>2.80</td>
<td>1.138</td>
<td>P&gt;0.05 (Not significant)</td>
</tr>
<tr>
<td>T₈</td>
<td>15.51</td>
<td>3.14</td>
<td>13.88</td>
<td>3.20</td>
<td>1.940</td>
<td></td>
</tr>
<tr>
<td>T₆</td>
<td>18.54</td>
<td>2.76</td>
<td>17.00</td>
<td>3.19</td>
<td>1.101</td>
<td></td>
</tr>
</tbody>
</table>

SD: Standard deviation

Motor Block
The onset of motor blockade, degree, and time required to achieve complete blockade were recorded. The degree of motor blockade was graded according to modified Bromage scale. The mean time to achieve complete motor blockade was 18.9 min in Group A and 18.63 in Group B, which was statistically insignificant in both the groups (Table 4 and Graph 2).

There were no significant changes in other parameters such as mean pulse rate, mean arterial pressure, and respiratory rate.

Mean Duration of Analgesia
Duration of analgesia in Group A was 766.6 min compared to Group B which is 471 min. This was statistically significant (P < 0.05) (Table 5 and Graph 3).

Side Effects
Incidence of nausea and vomiting was noted in 12 patients in Group A (40%) and 2 patients in Group B (10%). However, it was treatable with single dose of antiemetic without deleterious effects on the patients. 10 patients (33%) in Group B developed pruritus which was mild in nature and did not require any intervention (Table 6).

DISCUSSION
Pain includes not only the perception of an uncomfortable stimulus but also the response to that perception. Localised sensation of discomfort felt immediately after noxious stimulus which disappears when the stimulus ceases is called fast pain. Pain that is perceived later by the patient for longer duration as burning, dull or warm is called slow pain. Satisfactory pain relief has always been a difficult problem in clinical practice. Epidural anesthesia using a single injection of 0.5% bupivacaine will provide good...
perioperative analgesia and muscular relaxation with graded hypotension and decreased blood loss by causing motor, sensory, and sympathetic blockade, hence gaining popularity ever since its introduction.

Epidural administration of various analgesics gained increasing popularity following the discovery of opioid receptors in the spinal cord capable of producing potent analgesia as reported by Taksh and Rudy in 1976. Opioid receptors in the dorsal horn have pre- and post-synaptic effects and affect the modulation of nociceptive input but does not cause sympathetic or motor blockade. It is now clear that epidural administration of opioid is superior to traditional intravascular and intramuscular injection of opioids. Morphine and pethidine remain the standard drugs used for postoperative pain, but they are associated with delayed respiratory depression and abuse potential.

Buprenorphine which was introduced in 1966, when given epidurally acts on supraspinal region and produces spinal segmental analgesia in a dose-related manner. The diffusion of buprenorphine from the spinal cord in the blood stream is slow and does not reach the bulbular centers with bulk of cerebrospinal fluid due to its lipophilic nature.

Fentanyl when administered through epidural crosses dura and binds to spinal opioid receptors. It is absorbed systemically, binds to supraspinal opioid receptors to produce analgesia.

The aim of this study is comparison of efficacy of buprenorphine and fentanyl when used as adjuncts to bupivacaine epidurally for perioperative analgesia in lower abdominal and lower limb surgeries. Sixty patients were selected into two groups: A and B as discussed earlier.

Mean time for onset of analgesia is noted as 7.53 min in Group A and 6.60 min in Group B, which was statistically insignificant. Zenz et al. compared epidural buprenorphine and epidural morphine and concluded that buprenorphine-produced analgesia with short latency 6.8 min which is closer to our observation of 7.53 min. High lipid solubility of buprenorphine results in fast distribution to opioid receptors present in spinal cord and central nervous system and increases its concentration there. Dhaile et al. in 2000 studied different doses of epidural fentanyl (25, 50, 75 µg) with 0.5% bupivacaine for perioperative analgesia found that 50 µg had a quicker onset of analgesia within 9.53 min which is closer to our observation. The mean time to achieve complete motor blockade was 18.9 min in Group A and 18.63 min in Group B which was statistically insignificant when compared.

Both the groups maintained hemodynamic stability which was statistically insignificant and there were no significant changes with respiratory parameters in either of the groups during both peri- and post-operative period. Rathi and Singh in 1993 studied postoperative analgesic efficacy with different doses of extradural buprenorphine for herniorrhaphy and found that buprenorphine in 0.3 mg is

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Table 4: Motor block

<table>
<thead>
<tr>
<th>Grade</th>
<th>Group A (min)</th>
<th>SD</th>
<th>Group B (min)</th>
<th>SD</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6.1</td>
<td>2.6</td>
<td>6.66</td>
<td>2.02</td>
<td>0.204 P&gt;0.05 (Not significant)</td>
</tr>
<tr>
<td>1</td>
<td>10.3</td>
<td>2.84</td>
<td>10.13</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>13.83</td>
<td>2.78</td>
<td>14.46</td>
<td>3.08</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>18.9</td>
<td>3.55</td>
<td>18.63</td>
<td>3.25</td>
<td></td>
</tr>
</tbody>
</table>

SD: Standard deviation

Table 5: Mean duration of analgesia

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number of patients</th>
<th>Mean±SD</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>30</td>
<td>766.6±169.67</td>
<td>7.178</td>
<td>P&lt;0.05 S</td>
</tr>
<tr>
<td>Group B</td>
<td>30</td>
<td>471±148.68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SD: Standard deviation

Table 6: Side effects

<table>
<thead>
<tr>
<th>Side effects</th>
<th>Group A Patients (%)</th>
<th>Group B Patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>9 (30)</td>
<td>2 (10)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>3 (10)</td>
<td>-</td>
</tr>
<tr>
<td>Urinary retention</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pruritus</td>
<td>-</td>
<td>10 (33.3)</td>
</tr>
<tr>
<td>Hypotension</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Graph 3: Mean duration of analgesia
suitable for single-shot epidural injection which provides both intra- and post-operative analgesia with hemodynamic stability. Ozalp et al.\textsuperscript{12} concluded that epidural fentanyl was hemodynamically stable with fewer side effects and excellent in providing postoperative analgesia when compared to epidural morphine.

Ichiishi et al.\textsuperscript{13} found that 0.2 mg of epidural buprenorphine gave a satisfactory postoperative pain relief and less respiratory depression and respiratory inductive plethysmography is a useful method for the measurement of postoperative respiratory function.

Incidence of nausea and vomiting was more in Group A (40%) compared to Group B (10%). 33% of patients in Group B developed pruritus which was mild in nature and did not require any intervention. Observations of the study done by Kumar and Gupta\textsuperscript{14} and and Hayashi et al.\textsuperscript{15} also correlate with our study.

Duration of analgesia was significantly longer in Group A (766 min) when compared to Group B (471 min). Hence, buprenorphine scored over fentanyl in offering longer duration of analgesia. High lipid soluble, strong opiate receptor binding, and intense and prolonged activity of epidural buprenorphine were responsible for longer duration of action.\textsuperscript{6}

CONCLUSION

The postoperative analgesia was definitely of a longer duration with the buprenorphine group when compared to fentanyl group. Hence, it is concluded that epidural buprenorphine is better in providing prolonged satisfactory postoperative analgesia as compared to fentanyl when it is used as adjuncts with bupivacaine. There were no significant hemodynamic changes in either of the groups. Regarding the side effects, although the incidence of nausea and vomiting was more in buprenorphine as compared to fentanyl group, it was treatable with single dose of antiemetic without deleterious effects on the patients.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
A Retrospective Analysis of Hysterolaparoscopy Findings of Unexplained Infertility Patients in a Tertiary Care Hospital

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INTRODUCTION

Infertility, according to the WHO, is defined as failure to conceive after 12 months or more of regular unprotected sexual intercourse. As routine examinations and procedures are often unable to diagnose some pelvic pathologies, hysterolaparoscopy has become an important diagnostic modality to detect some hidden pelvic pathology in infertile females.

Purpose: To determine the role of diagnostic hysterolaparoscopy in the evaluation of unexplained infertility.

Materials and Methods: This is a retrospective study conducted at Guru Teg Bahadur Hospital in Infertility Clinic during 2012 (January) to 2015 (May). In the present study, unexplained infertility patients were recruited, and they underwent diagnostic hysterolaparoscopy between 1st January 2012 and May 2015. Those patients who had no detectable pathology based on history, physical examination, and ultrasound and had treatment for three or more cycles in the form of ovulation induction and intrauterine insemination were included in the study. Moderate and severe male factor infertility was exclusion criteria.

Results: Of 130 patients, pelvic pathology by laparoscopy was found in 81 (62.3%) of cases and pelvic inflammatory disease pathology was the most common finding (39.2%). Major hysteroscopic abnormality in our study was septum in 14 cases (10.7%).

Conclusions: Hysterolaparoscopy is an effective diagnostic tool for evaluation of certain significant and correctable tuboperitoneal and intrauterine pathologies such as peritoneal endometriosis, adnexal adhesions, and subseptate uterus, which are usually missed by other imaging modalities.

Key words: Hysteroscopy, Infertility, Lapar

Access this article online

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

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Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/149
2012 to May 2015 retrospectively. All the infertile patients who underwent diagnostic hysterolaparoscopy were fulfilling the following inclusion criteria. Women aged 20-40 years, primary or secondary infertility, normal ovulatory cycles and normal serum level of thyroid-stimulating hormone, prolactin, normal semen analysis, and hysterosalpingogram. Patients with active genital infection were excluded; 130 patients with unexplained infertility were enrolled in our study.

Diagnostic hysterolaparoscopy with chromopertubation was performed in the follicular phase in all the patients. The following parameters such as tubal pathology, ovarian pathology, peritubal, periadnexal and pelvic adhesions, endometriosis during laparoscopy, and abnormality of uterine cavity and bilateral tubal ostium during hysteroscopy were noted.

RESULTS

Of 130 cases, 82 cases (63.07%) had primary infertility and 48 (36.92%) had secondary infertility (Figure 1). The majority of cases (80, 61.5%) belonged to the age group of 26-30 years. A total of 10 cases (7.7%) were in the age group of 20-25 years, 32 (24.6%) belonged to 31-35 years, and 8 (6.1%) to 36-40 years (Figure 2).

Our study showed pelvic pathology by laparoscopy in 81 (62.3%) of cases, and the results are as follows. Pelvic inflammatory disease pathology was the most common finding (39.2%), followed by ovarian pathology (21.5%). Tubal block comprised 9.2% whereas distorted uterus by fibroid in 6.15% and pelvic endometriosis in 6.9% of infertile cases were diagnosed.

Major hysteroscopic abnormality in our study was septum in 14 cases (10.7%).

DISCUSSION

Hysterolaparoscopy has been proven as an effective tool in investigation of unexplained infertility patients as early therapeutic interventions or early decisions for artificial reproductive technique can be taken place.4

In our study, 63% of cases had primary infertility and 37% of cases had secondary infertility. Similar results were seen in Nayak et al’s study, 69% had primary infertility, and 35% had secondary infertility.5

In our study, laparoscopy detected pelvic pathology in 62.3% of cases, whereas Jayakrishnan et al. found findings by laparoscopy in 87.4% of cases,6 every laparoscopic finding was not significant enough to affect fertility; therefore, Capelo et al. defined positive laparoscopy consisting of Stage III or IV endometriosis, an endometrioma, pelvic adhesion, or tubal disease (Table 1).7

Nayak et al. detected positive pelvic pathology in 30% of cases by laparoscopy,5 Jayakrishnan et al. detected pelvic pathology in 26.8% of cases,6 whereas in our study, significant pelvic pathology was detected in 29.2% of cases.

In our study, the most common pathology detected by laparoscopy was ovarian pathology, accounting for 31.5% of all cases. Similar results were seen in studies done by Puri et al., they detected polycystic ovarian syndrome in 31.5% of cases8 whereas in our study, significant pelvic pathology was detected in 29.2% of cases.

Congenital uterine anomalies have been associated with pregnancy loss and obstetric complications. Our study found septate uterus as the most common anomaly 10.7% which was similar to study of Kabadi and Harsha, they
found septate uterus in 13.8%. Septate uterus is associated with highest reproductive failure rate, 65% losses occurring in the first trimester. Surgical correction of septum improves the pregnancy outcome uterus with 80% term delivery, 5% preterm delivery, and 15% pregnancy loss.

In our study, hysteroscopic abnormalities also revealed myomas and polyp in 10 (7.7%) and synechiae in 5 (3.8%), which was similar to other studies result (Table 2).

Our study revealed bilateral tubal block in 5.38% of cases and unilateral block in 4.6% of cases whereas Kabadi and Harsha found bilateral block in 4.3% and unilateral block in 3.2% of cases.

Many studies found that laparoscopy done before starting the infertility treatment have detected significant abnormalities in unexplained infertile women.

Thus, diagnostic hysterolaparoscopy is the important diagnosing tool in unexplained infertile women.

CONCLUSION

Diagnostic hysterolaparoscopy is an effective, safe, and minimal invasive tool in the evaluation of infertility by which we can also correct the abnormalities that are missed by routine history, examination, and usual imaging procedures. Hence, hysterolaparoscopy should be considered as a definitive investigative daycare procedure for evaluation of unexplained infertility patients. However, further randomized studies are needed to prove its definite role.

REFERENCES

A Retrospective Observational Study of Dengue Fever in a Tertiary Care Center in Kerala

Peter P Vazhayil, Sindhu Thomas Stephen, Vinoth Kumar

Abstract

Introduction: Dengue fever (DF) has emerged as an important infectious disease in Kerala with increasing incidence year after year. Knowledge of the clinical and laboratory profile is essential in the early diagnosis and appropriate management of this occasionally fatal illness.

Materials and Methods: This is a descriptive, observational, record-based study done in the Department of Pediatrics, Government Medical College, Ernakulam. All children <15 years of age diagnosed to have DF were classified according to WHO new case classification guidelines, and their clinical and laboratory profile were recorded in a pro forma and analyzed.

Results: Among the 78 dengue serology positive cases, 19.23% had DF with no warning signs, 57.20% had DF with warning signs, and 23.07% had severe dengue. The most common age group affected was 11-15 years (46%) with a male to female ratio of 1.68:1. Fever was seen in all cases followed by vomiting, myalgia, and headache. Hepatomegaly was a major clinical finding observed in 56.41%, while hypotension and low pulse pressure was seen in 12.82% of cases. Lab parameters showed leukopenia in 48.72% and severe thrombocytopenia 8.97% patients. Among those with elevated liver enzymes, aspartate aminotransferase rise was more than alanine aminotransferase in all cases, but none had values above 1000 U/L. Blood products were needed in 15.38% cases. There was no mortality observed in our study.

Conclusion: DF continues to be a major health hazard in children. Strong clinical suspicion, early diagnosis with rapid tests and strict adherence to revised WHO guidelines definitely favors a very good outcome.

Key words: Aspartate amino transferase, Bradycardia, Dengue fever, Thrombocytopenia, Warning signs

INTRODUCTION

Dengue infection is a major health problem in India. Every year during the period from July to November, there is an upsurge of dengue cases in South India as this region receives heavy rains (>200 cm) during the southwest monsoon. Temperature and rainfall are major climatic factors responsible for dengue epidemic during this season. The clinical spectrum ranges from self-limiting influenza-like illness to life-threatening dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS). The severity of disease is more in children with 90% of DHF occurring in <15 years of age. There are four antigenic types of dengue virus (DENV) 1, 2, 3, 4. DENVs are transmitted by Aedes aegypti mosquito. The primary infection in a nonimmune person usually causes dengue fever (DF) and subsequent infection by a different serotype causes more severe illness like DHF/DSS. Clinical manifestations of dengue seem to be changing. Fever, rash, body ache, and bleeding manifestations are still the common manifestations; however, clinicians in the endemic areas should be aware of unusual presentations such as fulminant hepatic failure, severe plasma leakage, shock, altered sensorium, cardiac involvement, and acute renal dysfunction.

DF has emerged as an important infectious disease in Kerala state. According to survey done by the Centre for Research in Medical Entomology, Kerala started reporting deaths due to DF as early as 1997. Since then there has
been frequent outbreaks of DF every year in various districts of Kerala such as Kottayam, Idukki, Ernakulam, and Thrivananthapuram. Understanding the clinical and laboratory profile of DF is essential for early diagnosis and appropriate patient management which can improve the outcome of this potentially morbid and occasionally fatal disease in the pediatric population.

Our study outlines the clinical spectrum and the various manifestations as well as evaluates the laboratory findings in hospitalized cases of DF.

**MATERIALS AND METHODS**

This is a descriptive, observational, record-based study done in the Department of Pediatrics, Government Medical College, Ernakulam, during the period January 1, 2015 to December 31, 2016. We retrospectively analyzed the case records of children <15 years diagnosed to have DF both clinical and lab confirmed - either by nonstructural protein 1 (NS1) antigen positive or anti-dengue immunoglobulin M (IgM) antibody positive during this study period. Dengue with comorbid conditions that may affect the outcome such as major congenital anomalies and debilitating chronic illness as well as patients with incomplete medical records were excluded from the study. Data were entered in a standard pro forma prepared by literature review and expert opinion. Dengue infection was classified according to WHO classification 2009 as dengue without warning signs, dengue with warning signs and severe dengue (SD).1

- DF: Fever with any two of: Nausea, vomiting, rash, myalgia, leukopenia, positive tourniquet test.
- DF with warnings signs DFWS: The above with any one of: Abdomen pain, tenderness, persistent vomiting, ascites, pleural effusion, mucosal bleeding, lethargy, restlessness, hepatomegaly, increase in hematocrit (HCT) with a rapid decrease in platelet count.
- SD: The above with at least one: Severe plasma leakage such as shock and pleural effusion, severe bleeding, severe organ involvement-liver, central nervous system, and heart.

The data entered in the pro forma included symptoms and clinical findings both at the time of presentation, as well as during hospitalization. Hypotension was taken as systolic blood pressure (SBP) below the following values for the age groups: Below 1 year <70 mmHg, 1-10 years <70 mmHg + (age in years ×2), above 10 years <90 mmHg. Narrow pulse pressure was taken as the difference between SBP and diastolic BP ≤20 mmHg and heart rate <60/min was considered as bradycardia. Laboratory analysis relevant to DF included HCT, hemoglobin (Hb), total count at the time of admission as well as lowest platelet count, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) values during hospitalization. Results of rapid qualitative immunochromatographic test for detection of NS1 antigen, IgM and IgG antibodies using Helico Dengue Combo Kit were also recorded. In relevant cases, ultrasound abdomen findings of hepatomegaly, ascites, gallbladder wall edema, and chest X-ray findings of pleural effusion were documented.

Other parameters studied included blood product transfusions, duration of hospital stay, and outcome in the form of improvement with or without complications. The statistical analysis was performed using SPSS 16.020 software.

**RESULTS**

We evaluated 78 cases of DF out of 87 confirmed cases. 7 cases were excluded due to insufficient data in the records. 2 cases were also excluded as they had comorbid conditions such as malaria and hereditary spherocytosis.

Among the 78 dengue serology positive cases, 15 (19.23%) had DF with no warning signs, 45 (57.20%) had DFWS, and 18 (23.07%) had SD. There were 36 (46.15%) patients in the age group 11-15 years being the commonest age group affected, followed by 27 (36.62%) in the age group 6-10 years and 15 (19.23%) in 0-5 years age group (Table 1). The male to female ratio was 1.68:1.

The maximum admissions were during the months of May to August with 69 confirmed cases (88.46%) of DF followed by January to April with 5 cases (6.41%) and September to December with 4 cases (5.13%).

Common clinical features included fever (100%), vomiting (64.1%), headache (41.02%), myalgia (46.15%), abdominal

<table>
<thead>
<tr>
<th>Table 1: Distribution of dengue according to WHO classification</th>
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<tbody>
<tr>
<td>Cases</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>DF</td>
</tr>
<tr>
<td>DFWS</td>
</tr>
<tr>
<td>SD</td>
</tr>
<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Table 2: Age distribution of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>0-5</td>
</tr>
<tr>
<td>6-10</td>
</tr>
<tr>
<td>11-15</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
pain (41.02%), petechiae (14.10%), melena (11.53%), maculopapular rash (11.53%), retro orbital pain (8.97%), and convulsions (2.56%) (Table 3). Hepatomegaly was noted in 56.41% cases, hypotension in 12.82%, narrow pulse pressure in 12.82%, pleural effusion in 10.25%, ascites in 7.69%, and bradycardia in 7.69% of DF cases (Table 4). About 35 (44.87%) cases had normal leukocyte count, while leukopenia was seen in 38 (48.72%) and leukocytosis in 5 (6.41%) cases. Increased mean Hb and HCT values along with decreased platelet counts were seen in the SD group (Table 3). Platelet count was <20,000 in 7 (8.97%) patients (Figure 1). AST >100 U/L was seen in a larger proportion of patients 38 (48.71%) when compared to ALT >100 U/L in 16 (20.5%). In all these patients, AST was elevated more than ALT, with three patients having AST values more than 500 and none having liver enzyme values above 1000. Dengue NS1 Ag was positive in 57.69%, followed by IgM antibody in 17.95% and NS1 Ag + IgM antibody in 14.1%. Ultrasonography of abdomen of patients who had warning signs and SD revealed hepatomegaly as the most common finding (Table 5).

Fever was managed with paracetamol; fluid management was according to WHO protocol by using normal saline. Blood products were given in 12 (15.38%) cases. The duration of hospital stay ranged from 4 to 8 days. There was no mortality in the study group during the study period.

**DISCUSSION**

This study describes the clinical features, laboratory findings and outcome of DF, DFWS, and SD in pediatric patients. We had 15 (19.23%) cases of DF with no warning signs, 45 (57.20%) cases of dengue with warning signs, and 18 (23.07%) cases of SD. The high incidence of DFWS correlates with the study conducted by Jain.11 The maximum number of dengue cases in our study were seen in the months of May to August which indicated an active viral transmission during monsoon and post-monsoon period as reported in earlier studies.12,13 A male predominance seen was similar to various studies.14,15 The most common age group affected was 11-15 years (46.15%). This correlated with a study conducted by Eregowda and Valliappan16 and Mishra et al.17

Common clinical features included fever, vomiting, headache, myalgia, abdominal pain, petechiae, melena, maculopapular rash, and retro-orbital pain as shown in the previous studies.16,18,19 Skin bleeds in the form of petechiae was the most common hemorrhagic manifestation followed by melena19,20 as against epistaxis in some studies.21,22 Hepatomegaly followed by narrow pulse pressure and hypotension were common clinical findings. In our study, the most common cardiac manifestation was bradycardia (7.69%) which is also the most common finding in various other studies.23

Higher levels of Hb and HCT were found in patients with SD in contrast to study by Kale et al. which showed higher Hb and HCT in the DF without warning signs.24 In our study, severe thrombocytopenia (platelet count <20000) was seen in 8.97% which correlated with a study by Kale et al. where they had 6.67% of cases with severe thrombocytopenia.24

In this study, elevation of AST was more when compared to ALT in all cases which coincide with other studies.25 Increase in AST more than ALT in dengue is thought to be due to the involvement of myocytes. Very high levels of AST and ALT going above 1000 U/L indicate severity of the disease along with morbidity and mortality and this differs from that seen in other viral hepatitis.26 In our study,

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>DWS</th>
<th>SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb (g%)</td>
<td>11.99±1.083</td>
<td>12.40±1.53</td>
<td>12.64±1.24</td>
<td>12.37±1.392</td>
</tr>
<tr>
<td>HCT%</td>
<td>37.35±3.06</td>
<td>40.12±4.33</td>
<td>41.45±5.30</td>
<td>39.9±4.53</td>
</tr>
<tr>
<td>Platelet (10³/µL)</td>
<td>1.87±0.75</td>
<td>0.93±0.58</td>
<td>0.65±0.74</td>
<td>1.05±0.77</td>
</tr>
<tr>
<td>AST (U/L)</td>
<td>82.53±49.58</td>
<td>130.95±108.5</td>
<td>197±213.26</td>
<td>129.77±137.19</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>57.6±50.14</td>
<td>81.57±72.98</td>
<td>100.5±111.51</td>
<td>76.5±80.08</td>
</tr>
</tbody>
</table>

DF: Dengue fever, SD: Standard deviation, AST: Aspartate amino transferase, ALT: Alanine amino transferase, Hb: Hemoglobin, HCT: Hematocrit

![Figure 1: Platelet count in dengue fever](image)
Table 4: Clinical profile of DF

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>78 (100)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>50 (64.10)</td>
</tr>
<tr>
<td>Myalgia</td>
<td>36 (46.15)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>32 (41.02)</td>
</tr>
<tr>
<td>Headache</td>
<td>32 (41.02)</td>
</tr>
<tr>
<td>Petechiae</td>
<td>11 (14.10)</td>
</tr>
<tr>
<td>Rash</td>
<td>9 (11.53 )</td>
</tr>
<tr>
<td>GI bleed</td>
<td>9 (11.53 )</td>
</tr>
<tr>
<td>Lethargy</td>
<td>7 (8.97)</td>
</tr>
<tr>
<td>Retro-orbital pain</td>
<td>7 (8.97)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>4 (5.12)</td>
</tr>
<tr>
<td>Seizure</td>
<td>2 (2.56)</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>44 (56.41)</td>
</tr>
<tr>
<td>Hypotension</td>
<td>10 (12.82)</td>
</tr>
<tr>
<td>Low pulse pressure</td>
<td>10 (12.82)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>8 (10.25)</td>
</tr>
<tr>
<td>Ascites</td>
<td>6 (7.69)</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>6 (7.69)</td>
</tr>
</tbody>
</table>

DF: Dengue fever, GI: Gastrointestinal

Table 5: Radiological findings

<table>
<thead>
<tr>
<th>Findings</th>
<th>DFWS (%)</th>
<th>SD (%)</th>
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<tbody>
<tr>
<td>Hepatomegaly</td>
<td>24 (53.33)</td>
<td>12 (66.66)</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>1 (2.22)</td>
<td>0</td>
</tr>
<tr>
<td>Peri-gallbladder edema</td>
<td>3 (6.66)</td>
<td>4 (22.22)</td>
</tr>
<tr>
<td>Ascites</td>
<td>3 (6.66)</td>
<td>7 (38.33)</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>1 (2.22)</td>
<td>8 (44.44)</td>
</tr>
</tbody>
</table>

DFWS: Dengue fever with warning signs, SD: Severe dengue

only three patients had AST value more than 500 and none had values above 1000. The majority of the patients in this study were positive for NS1 followed by IgM. This is due to the early presentation and early admission of suspected DF cases.17

In this study hepatomegaly, gallbladder wall edema and ascites were the predominant findings in ultrasound scan of abdomen in patients with warning signs and SD. This was found to be significantly associated with severe presentations of DF in some studies, and therefore, can be taken as an indicator of severity of DHF in children.27,28

CONCLUSION

DF is a common acute febrile illness which comes as an epidemic in various parts of the country including Kerala. Over the recent years, it has emerged as one of the dreaded fevers in children. In our study, the most common age group affected is 6-15 years with maximum number of cases during the monsoon and post-monsoon season. Fever, vomiting, headache, myalgia, and abdominal pain continue to be the common presentation. Rise in AST more than ALT is a consistent finding in DF along with rise in HCT and Hb. Radiological evaluation will also help in assessing the severity of the illness and thus initiating appropriate therapy. Knowledge and understanding of the varied presentations of DF in a region will definitely help in improving the outcome of this potentially fatal disease.

REFERENCES

Vazhayil, et al.: Retrospective Observational Study of Dengue Fever


How to cite this article: Vazhayil PP, Stephen S, Kumar V. A Retrospective Observational Study of Dengue Fever in a Tertiary Care Center in Kerala. Int J Sci Stud 2017;5(1):30-34.

Source of Support: Nil, Conflict of Interest: None declared.
A Study on Clinical, Laboratory Profile and Drug Sensitivity Pattern in *Salmonella* Positive Patients

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**Abstract**

**Introduction:** Enteric fever is endemic and is a major public health burden in India. This study is conducted to assess the change in clinical presentation, morbidity and the sensitivity pattern to the drugs used in enteric fever.

**Aim:** (1) To study the clinical presentation, laboratory features and sensitivity pattern of *Salmonella* positive patients in blood culture, (2) to analyze the treatment, complications, morbidity, and mortality related to the disease.

**Materials and Methods:** It is a prospective observational study conducted in a Tertiary Care Medical College Hospital at Chennai between May 2014 and May 2016 in patients above 18 years of age who tested positive for *Salmonella* in blood culture. From the patient, details of history, clinical examination, investigations, and treatment were collected. Their antibiotic sensitivity pattern was recorded. Patients were followed up throughout the course of hospital stay and complications were also recorded. Defervescence of fever after antibiotics was also recorded.

**Results:** A total of 76 patients were studied who were blood culture positive. Fever with vomiting, loose stools, headache, and cough were the common clinical manifestations of enteric fever. Absolute eosinopenia, mildly elevated liver enzymes with normal leukocyte count or leukopenia with neutrophilia can be a pointer for enteric fever. Nalidixic acid resistance (97.4%), return of susceptibility to chloramphenicol (98.7%), co-trimoxazole (98.7%), and ampicillin (98.2%) are other important findings in this study.

**Conclusion:** There is a trend toward emerging resistance to 3rd generation cephalosporins due to increased defervescence time is seen in patients treated with cephalosporins. Common complications two decades ago causing high mortality and morbidity has reduced. However, other atypical presentations and complications involving other system sparing gastrointestinal system should be kept in mind due to antibiotic exposure prior hospitalization.

**Key words:** Antibiotic susceptibility, Fever defervescence, Nalidixic acid resistance, *Salmonella*

**INTRODUCTION**

Enteric fever is a major public health burden in India, and estimated cases range from 11.9 to 26.9 million and 129,000-217,000 deaths worldwide each year. The hallmark feature of enteric fever includes fever and gastrointestinal (GI) symptoms such as abdominal pain, vomiting, and loose stools which occur in varying frequency. High prevalence of drug resistance, inadequate and inappropriate antibiotic exposure leads to various atypical manifestations of the disease and high index of suspicion is required for the diagnosis. *Salmonella paratyphi* A is thought to cause milder disease than *Salmonella typhi* which is also becoming atypical and severe. Resistance to nalidixic acid which is an early generation quinolone can serve as a marker for decreased susceptibility to fluoroquinolones. This study is conducted to assess the change in clinical presentation, morbidity and the sensitivity pattern to the drugs used in enteric fever.

**Aim of the Study**

- To study the clinical presentation, laboratory features and sensitivity pattern of *Salmonella* positive patients in blood culture.

**Access this article online**

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• To analyze the treatment, complications, morbidity and mortality related to the disease.

**MATERIALS AND METHODS**

**Inclusion Criteria**

1. Patients aged ≥18 years.
2. Both males and females.
3. All cases of *Salmonella* positive in blood culture.
   Includes all species of *Salmonella* such as *typhi*, *paratyphi*, and *typhimurium*.
4. Patients associated with other causes of fever such as malaria, dengue with *Salmonella* positive in blood culture.
5. Stool, urine, and bone marrow positive for *Salmonella* species.

**Exclusion Criteria**

1. Patients aged <18 years.
2. Only widal or other serological tests for enteric fever positive cases with sterile blood culture.
3. Outside culture positive cases are not included.

It is a prospective observational study conducted in a Tertiary Care Medical College Hospital at Chennai between May 2014 and May 2016. After appropriate informed consent from the patient, details of history, clinical examination, investigations, and treatment were collected. Their antibiotic sensitivity pattern especially for ampicillin, chloramphenicol, co-trimoxazole, tetracycline group of antibiotics, sensitivity to nalidixic acid, quinolones including ciprofloxacin, norfloxacin, cephalosporins, and azithromycin was recorded. Patients were followed up throughout the course of hospital stay and complications were also recorded. Defervescence of fever after antibiotics was also recorded.

**RESULTS**

**Demographics**

In our study, a total of 76 patients were studied of which males predominated with 78.9% of the total study population, i.e., 60 patients, and females comprised 21.1% which was 16 patients. Most patients were from 19 to 40 age group (86.9%) and the 41-60 years’ age group (10.5%).

In our study, most patients compromised 1-7 days of fever group (68.5%), fever of 8-14 days comprising 19.7%. Most patients took an antibiotic before admission comprising 67.1%. Most common clinical sign seen in our study was relative bradycardia comprising 44.7%. Unusual manifestations such as polyarthritis, crepitations, oral candidiasis, and parotid swelling were seen.

**Laboratory Profile**

Mean hemoglobin was 12.599, mean total count was 5488.158 cells per cubic mm, and average platelet count was 1,65,140. On analyzing the complete blood cell count, anemia was seen in 17.1% of the patient. Leukocyte count was normal in most of the patients (80.3%). Neutrophilia and eosinopenia were seen in a significantly higher number of patients in about 98.7% and 89.5%, respectively. Thrombocytopenia was seen in 27.6% of patients which became normal on treatment. Acute kidney injury (AKI) was seen in 8 patients out of whom 6 patients had an increase in blood urea nitrogen too, who also had symptoms of GI loss and clinical signs of dehydration consistent with prerenal AKI. On comparing the baseline liver function test, it was noted that the average aspartate aminotransferase test and ALT were 3 times the baseline values.

**Ultrasound Findings**

The most common ultrasound abdomen findings were normal in 56.6%, mild splenomegaly in 22.4% of patients, mild hepatomegaly in 6.6% of patients, and mild hepatosplenomegaly in 6.6% of patients.

**Widal Test and Culture**

Widal test was done only in 40 patients out of 76 who presented with fever duration of more than 7-10 days. In that positive results were seen in only 35% of patients. Majority of culture positive patients were *S. typhi* positive accounting for 81.6%.

**Antibiotic Sensitivity Pattern and Time to Fever Defervescence**

There is a high prevalence of nalidixic acid resistance in our study which was 97.4% and the return of sensitivity to ampicillin (88.2%), chloramphenicol (98.7%), co-trimoxazole (98.7%), and tetracycline (98.7%). Empirical treatment was started in 27 patients. Fluoroquinolones though started empirically in 16 patients, it was changed to cephalosporins after the culture report due to nalidixic acid resistance.

Time to defervescence or clinical response was defined as the time taken from the initiation of antibiotic to the time in days when temperature remained below 37.5°C for at least 24-48 h. Time to defervescence for patients treated with ceftriaxone was 3.86 days (range of 2-7 days). Azithromycin was added as a second line agent if the patient takes longer time for defervescence mostly more than 3-4 days. Hence, mean defervescence time is higher in combination therapy accounting 4.96 days.

**Complications**

Most common complication seen in our study was AKI accounting to 8% of patients.
DISCUSSION

A total of 76 culture positive enteric fever were collected during the study period. Fever was present in all patients. Most patients presented with fever duration of 1-7 days (68.5%). Only 10% had fever more than 2 weeks duration. Mean duration of fever was 8.66 days (range 2-60 days). This is similar to that seen in Gupta et al.1 (8.8 days) and Jog et al.2 (7 days). Very prolonged fever lasting for 60 days was seen in one patient which was unusual for enteric fever. Almost most of the patients showed the intermittent type of fever which was due to the use of antipyretics and antibiotics. No case in this study had step ladder type of fever, and this finding is same as reported by Pandey et al.3 and Kapoor et al.4

GI symptoms such as vomiting and loose stools were present only in 34.2% and 31.6%, respectively. This was similar to the study conducted by Gupta et al.1 (vomiting 33.3% and loose stools 24.7%) and Jog et al.2 (vomiting 42% and loose stools 31%). None of the cases had pea soup diarrhea which is typical of enteric fever. Burning micturition is an atypical presentation which was seen in 10.5% of a patient similar to that seen in a study by Dutta et al.5 (15.6%). Cough was seen in 15 patients (19.7%) out of which 7 had mucoid expectoration. 67.1% of patients took an antibiotic before admission. The usual perception by the clinicians that culture positivity falls with prior use of antibiotics proves wrong in our study and recommends to send blood culture in suspected enteric fever even if the patient is on antimicrobials.

Relative bradycardia was observed at admission in 44.7% of patients. Clinically nontender, mild splenomegaly was present in around 7.9% of patients, with mild hepatomegaly being present in 3.9% of patients and mild hepatosplenomegaly in the only one patient. Unusual presentations include hypotension (1.3%), oral candidiasis (1.3%), parotitis (1.3%), pneumonia (1.3%), and reactive arthritis (2.6%). No other cause of these manifestations could be found.

One patient had hypotension which was secondary to GI loss. Hypotension in an enteric fever should raise the suspicion of ileal perforation or rare cardiac manifestations like carditis or rhythm abnormalities. Hypotension without perforation is uncommon in enteric fever as evidenced by Chandrasekar et al.6 and Gupta et al.1

Oral candidiasis was reported in one patient who was HIV negative and did not have any immunocompromised state. This is similar to a case reported by Claudia Colomba et al. Typhoid fever causes a transient immunodepression state evidenced by transient fall in CD4 cell count.

One patient had painful parotid enlargement with no evidence of abscess formation. Parotitis with abscess has been reported in HIV patient in a case report from Moser et al. Unlike this case report our patient was HIV negative and did not have any immunocompromised state and patient also responded well to treatment. Two patients had features of polyarthritis. Investigations for other causes of polyarthritis were negative and synovial aspiration was also reactive fluid.

Anemia was present in 17.1% with normal hemoglobin in 82.9%. Total leukocyte count was in normal range in around 80.3%. Leukopenia was seen in 19.7%. None of the patients had leukocytosis on admission. Mean leukocyte count was 5488.15. Neutrophilia was present in 98.7%, and eosinopenia was present in 89.5% of patients. Absolute eosinopenia can be used a pointer for enteric fever if complete blood count is available similar to Deshmukh et al. (71.4%) and Jog et al.2 (77%). Thrombocytopenia was seen in 27.6% of patients which became normal on treatment. Mean platelet count was 1, 65, 140. Thrombocytopenia was comparatively more common compared to the previous studies like Chandrasekar et al.6 which had 13.4%.

Pancytopenia which occurs due to bone marrow suppression in enteric fever is less common and was seen in 2 of our 76 patients (2.6%). This is similar to the finding reported by Gupta et al.1 (5%) and Dutta et al.5 (6%). The bone marrow suppression is believed to be due to maturity arrest of the myeloid series, erythroblasts and megakaryocytes and excessive phagocytic activity of the histiocytes in the marrow.

AKI was seen in 8 patients out of whom 6 patients had an increase in blood urea nitrogen too, who also had symptoms of GI loss and clinical signs of dehydration consistent with prerenal AKI.

Anicteric hepatitis was seen in 46 patients whereas icteric hepatitis was seen in 13 patients. This is similar to the finding of Shetty et al., Chandrasekar et al.,6 and Gupta et al.1 Our findings suggest that typhoid fever should be included in the differential diagnosis of patients presenting with fever and jaundice.

The most common ultrasound abdomen findings were normal in 56.6%, mild splenomegaly in 22.4% of patients, mild hepatomegaly in 6.6% of patients, and mild hepatosplenomegaly in 6.6% of patients.

Widal test was done only in 40 patients out of 76 who presented with fever duration of more than 7-10 days. In that positive results were seen in only 35% of patients. Test was done after the 2nd week in 56% of patients.

...
among those who had negative test reports. This finding although not new, emphasizes the fact that the universal use of blood culture to diagnose enteric fever should be encouraged before starting antibiotic to a patient suspected with enteric fever.

Majority of culture positive patients were S. typhi positive accounting for 81.6. In contrary, our study had only 13.2% of S. paratyphi A positive species. S. typhimurium was seen in one patient, and three patients had undifferentiated Salmonella species. Antibiotic sensitivity pattern was done by disc diffusion method. There is a high prevalence of nalidixic acid resistance in our study which was 97.4% and the return of sensitivity to ampicillin (88.2%), Chloramphenicol (98.7%), Co-trimoxazole (98.7%), and tetracycline (98.7%) as seen in other Indian studies such as Chandrasekar et al., Gupta et al., Jog et al., and Gautam et al. Only one isolate was medical device reporting which belonged to S. typhi group. Although fluoroquinolones were the initial choice of antibiotic in enteric fever the high prevalence of NARST raises concern over their efficacy. Azithromycin resistance was not reported in any of the isolate as in previous studies.

Out of S. paratyphi a growth, only 1 had ampicillin resistant, and all the species were nalidixic acid resistant. Other drugs were sensitive. S. typhimurium and undifferentiated Salmonella species showed resistance only to nalidixic acid and sensitive to all other drugs.

Ceftriaxone was the initial antibiotic of choice in 90.78% of patients and cefotaxime for 7.8% of patients in our study. Although fluoroquinolones were started in 16 out of 27 patients empirically, they were changed to ceftriaxone after culture report in view of resistance to nalidixic acid. Change of antibiotic from fluoroquinolone to cephalosporin was premature. Hence, the efficacy of the drug could not be found in our study. 69.73% of cases in our study required second-line antibiotic therapy with azithromycin for poor response to cephalosporins as first-line antibiotic. Addition of second line agent was observed in higher numbers compared to the previous studies like Chandrasekar et al. (13.46%), nil in Gupta et al., Jog et al.

Time to defervescence for patients treated with ceftriaxone was 3.86 days (range 2-7 days). This was similar to other studies such as Jog et al. (4.2 days) and Gupta et al. (4.3 days). The time to defervescence for patients with S. typhi infection was 4.66 days (range 2-9 days) while that for patients with S. paratyphi A infection was 3.8 days (range 3-7 days). Combination therapy with cephalosporins and azithromycin did not show significant change to defervescence since it took 4.96 days for defervescence (range 2-9 days) compared to ceftriaxone alone had 3.86 days for defervescence (range 2-7 days). Azithromycin was added in the most patient only when fever was persistent for more than 3-4 days in most of the patients. 18% of our patients underwent investigation for pyrexia of unknown origin though blood culture was positive since defervescence of fever took longer time. This should be avoided and defervescence time should be given unless there is suspicion for other causes of fever.

All the complications seen in our study were reported from S. typhi infection only. Myositis was seen in one patient in our study. Proposed mechanisms for Salmonella-induced rhabdomyolysis and myositis include tissue hypoxia caused by sepsis, toxin release, direct bacterial invasion of muscle, and altered muscle metabolic capacity. Secondary hemophagocytic lymphohistiocytosis or macrophage activation syndrome was seen in one patient in our study.

Only one patient who presented with fever for 7 days had rectal bleeding after admission during the third day of ceftriaxone. The patient was diagnosed to have a terminal ileal perforation, and laparotomy was done. The patient also developed pseudomembranous colitis following ceftriaxone and vancomycin was also given, and the patient improved. One patient who presented with fever for 60 days had constipation and abdominal pain after the start of treatment. Colonoscopy was done which showed terminal ileal ulcer. Antibiotic course was completed and symptoms resolved. In Gupta et al. study, among 105 adults with enteric fever, intestinal perforation was observed in 10% of patients.

Typhoid intestinal perforation usually occurs in the ileum during the 3rd week of febrile illness and is due to necrosis of the Peyer’s patches in the antimesenteric bowel wall. Affected patients present with increasing abdominal pain, distension, peritonitis, and sometimes secondary bacteremia with enteric aerobic and anaerobic microorganisms.

CONCLUSION

Fever with vomiting, loose stools, headache, and cough were the common clinical manifestations of enteric fever. Cardinal signs of enteric fever such as splenomegaly and hepatomegaly were less commonly seen in our study probably due to early presentation and prior antibiotic intake. Other important conclusions which can be drawn from the study include importance of absolute eosinopenia as a diagnostic marker of typhoid, mildly elevated liver enzymes with normal leukocyte count or leukopenia with neutrophilia can be a pointer for enteric fever, high culture positivity despite receipt of prior antibiotics, high prevalence of nalidixic acid resistance (97.4%), return of
susceptibility to chloramphenicol (98.7%), co-trimoxazole (98.7%), and ampicillin (88.2%). In view of increased resistance to nalidixic acid, indiscriminate use of quinolones to be avoided and initial antibiotic has to be started based on the sensitivity pattern in the area. There is a trend toward emerging resistance to 3rd generation cephalosporins due to increased defervescence time seen in patients treated with cephalosporins. Ileal perforation and GI bleeding which was a common complication two decades ago causing high mortality and morbidity has reduced. However, other atypical presentations and complications involving other system sparing GI system should be kept in mind due to antibiotic exposure prior hospitalization. Mortality rate was nil in our study.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Role of Hepatic Artery Embolization in Giant Hemangioma of Liver

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Abstract

Introduction: Endovascular management in the form of transarterial embolization (TAE) is offered in cases of symptomatic hemangiomas, unresectable hemangiomas, preoperatively, in diffuse hemangiomatosis, in progressively growing hemangiomas, and those at a high risk of bleeding. Recent studies have shown that TAE is a safe and effective treatment option for lesions that are large and located peculiarly on inferior surface of liver and high risk of rupture.

Purpose: The purpose is to study the radiological features of giant haemangioma on various modalities, to assess the safety, feasibility, and efficacy of TAE of hepatic artery in giant liver haemangioma, and to evaluate post-procedural complications and follow-up (FU) examinations to look for success of embolization.

Materials and Methods: It is a prospective retrospective study conducted in Radiodiagnosis Department of GMCH, Nagpur. All giant hemangiomas detected on ultrasonography, computed tomography, or magnetic resonance imaging in symptomatic patients and already diagnosed cases presenting with recurrence/relapse and complicated giant hemangiomas were included in the study. Exclusion criteria were hemangiomas <4 cm in size and general contraindications to angiography, intolerance of contrast media, and peripheral vascular disease.

Results: The study revealed significant reduction in the size of lesion (P < 0.0001 – highly significant [HS]) at 3- and 9-month FU, respectively, in the right lobe of liver and (P < 0.0105 – significant [S] at 3-month FU and P < 0.0032 - HS at 9-month FU) the left lobe of liver.

Conclusions: TAE in giant hepatic hemangiomas is safe, feasible, efficient, minimally invasive with good patient acceptance, with minimal complications, and no mortality. Hence, transcatheter arterial embolization should be performed in the management of giant hepatic hemangiomas.

Key words: Computed tomography, Giant hepatic hemangiomas, Hepatic artery embolization, Transarterial embolization, Ultrasonography

INTRODUCTION

The modalities for the management of giant hemangiomas include corticosteroid therapy, radiofrequency ablation, hepatic artery ligation, intra-arterial embolization, anatomic liver resection, enucleation, and rarely liver transplantation.¹³ Surgical liver resection or enucleation is an effective curative treatment for giant hemangiomas; however considering the risk of massive intraoperative bleeding and following shock, surgery should be considered only for patients with established complications, diagnostic uncertainty, and incapacitating symptoms, where operative risk is acceptable.¹ Occasionally, liver transplantations are necessary when the giant hemangioma occupies the entire liver, diffuse hemangiomatosis, or ruptured.² Various other treatment methods such as corticosteroid injection, hepatic artery ligation, and radiotherapy show controversial results and their long-term results have been poor.⁴⁻⁶

Access this article online

www.ijss-sn.com

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

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Diagnosis of hemangioma can be made using various modalities such as ultrasound (USG), contrast-enhanced computed tomography (CECT), magnetic resonance imaging (MRI), technetium 99m-labeled red blood cell scanning, and digital subtraction angiography (DSA). However, histopathological diagnosis using fine-needle aspiration or biopsy is not recommended due to risk of rupture and high bleeding.

Transcatheter hepatic artery embolization is an interventional radiological technique. It is a minimally invasive procedure and can be done within much less time on patients and is not associated with significant morbidity when compared to open surgical procedures.

Hemangioma is one of the most common benign tumors of liver, accounting for 0.4-7.3% of all space-occupying hepatic lesions. Adam et al. defined hemangiomas as “giant” if their diameters exceed more than 4 cm.

Endovascular management in the form of transarterial embolization (TAE) is offered in cases of symptomatic hemangiomas, unresectable hemangiomas, i.e., involving both lobes, as a pre-operative temporizing procedure in ruptured hemangiomas, in diffuse hemangiomatosis, in progressively growing hemangiomas, and those at a high risk of bleeding. Recent studies have shown that TAE is a safe and effective treatment option for lesions that are large and located peculiarly on inferior surface of liver and high risk of rupture. Many case studies have been published to date on the role of hepatic artery embolization in giant liver hemangioma without any significant complications. The most common complications of embolization are pain, pyrexia, leukocytosis, and nausea, which last for a few days. Post-embolization pain is due to thrombosis and necrosis. Severe complications are rare and include infection, hepatic abscess and sepsis, and migration of the embolization agent into lungs and kidneys.

MATERIALS AND METHODS

The study was conducted in Intervention Radiology Unit, Department of Radiodiagnosis, Government Medical College, Nagpur, for 2 years (September 2013 to August 2015), over 29 patients.

Source of patients: Intervention Radiology Unit and Department of Surgery, Government Medical College Hospital, Nagpur.

Inclusion Criteria
1. All giant hemangiomas detected on USG, CT, or MRI in symptomatic patients or giant hemangiomas incidentally detected on USG, CT, or MRI in asymptomatic patients with undue risk of rupture
2. Known cases of giant hemangiomas with TAE or resection done and presenting with recurrence/relapse/not responding to treatment
3. Ruptured/complicated giant hemangiomas as intratumoral bleed.

Exclusion Criteria
1. Hemangiomas <4 cm in size
2. Patients with portal vein thrombosis
3. General contraindications to angiography, intolerance of contrast media, peripheral vascular disease
4. Hemorrhagic diathesis (international normalized ratio >1.4)
5. Deranged renal functions (serum creatinine >1.5 mg/dl)
6. Extremely debilitated and terminally ill patients.

Selection of Patients
Patients were selected by pre-procedural imaging diagnosis using USG, abdominal CT, and/or MRI with certain diagnosis of giant hemangioma of liver, either single or multiple, and after prior investigations, patients were subjected to transcatheter hepatic artery embolization.

Detailed history of patients was collected including medical history and personal history.

Ethical clearance was obtained from the Institutional Ethical Review Committee of Government Medical College, Nagpur.

Equipment used and Preparation of Patients
Patients’ blood pressure and pulse rate are monitored. Coagulation profile, hemoglobin and hematocrit, HIV and hepatitis B surface antigen status, liver and renal function tests were investigated. Patients were advised to be nil by mouth for 6 h at least before the procedure, and any history of allergies were ruled out.

Part preparation in the form of hair removal in puncture site, i.e., in bilateral inguinal region should be done before the procedure.

Premedication was given to the patients in the form of injection atropine 0.6 mg intramuscularly 10-15 min before the procedure. An eye bandage was given to the patient to reduce anxiety and apprehension. Patients were positioned supine on fluoroscopic table with C-arm positioned over the upper abdomen. The puncture site (inguinal region) was cleaned with povidone-iodine and surgical spirit. Using aseptic precautions, 2% lignocaine was utilized for local anesthesia. Using sterile dry cloths, the whole body was covered except for puncture site.
TAE Procedure
Under local anesthesia, the right femoral artery was punctured with single puncture needle using Seldinger technique. 5-F angiosheath was pushed and placed in position. Around 3000 U of heparin was given through the sheath.

Using Terumo guide wire, cobra catheter was placed in descending aorta. Coeliac, hepatic, and superior mesenteric angiograms are taken using contrast agent.

Angiography showed the intrahepatic slug or popcorn-like tumor signal. In the early arterial phase, the periphery of hepatic hemangioma was stained first, and the contrast agent gradually filled the inside of the lesion, known as “early leaving but late returning, hanging nut on a twig” sign.

After confirmation of the feeding arteries and the location, size, and number of hepatic hemangiomas, a microcatheter was superselectively placed in feeding arteries, and a mixture of polyvinyl alcohol (PVA) particles with lipiodol was slowly injected. Gelfoam was used in some patients, however coils were not utilized as a part of embolization procedure.

Post-procedural Care
Immediate postprocedural compression was given for 10 min at the site of femoral puncture to stop bleeding and a dressing was applied. The patient was reassured, and blood pressure, pulse rate, and respiratory rate were monitored. In case of pain, oral analgesics were given.

All patients were monitored postoperatively (vital signs, oxygen saturation) with particular attention paid to the lower limb skin temperature and color and dorsalis pedis pulses. Rehydration was considered paramount to protect the liver and prevent infection.

Follow up: The patients were followed up for around 9 months to observe for change in tumor size, appearance on USG, CT imaging, and symptoms.

RESULTS
In this study, only those patients who were diagnosed as giant hemangioma of liver on CECT and MRI were included; 1 patient who was initially diagnosed as giant hemangioma on USG, suggestive of hepatocellular carcinoma on CECT, was excluded from the study. Hence, analysis was made on 28 patients.

Analysis of the following important observations was made.

Female-to-male ratio was 2:1, and majority of the patients were in the age group of 31-50 years, i.e., 20 patients accounting for 71.4% of cases.

Table 1 shows clinical presentation of cases. Most of the patients were symptomatic, presented with discomfort and fullness of abdomen (39.2%), abdominal pain (21.4%), and with jaundice (3.6%). Around 35.7% of patients presented incidentally, out of which 5 patients had hepatomegaly and palpable mass.

USG Features (Figure 1)
USG is an important preliminary investigation in the diagnosis of hemangioma. Thirteen (46%) cases of giant hemangioma are solitary and rest of the cases show multiple giant hemangioma.

Only right lobe involvement was seen in 14 cases; solely left lobe involvement in 3 cases and both lobes’ involvement seen in 11 cases.

<table>
<thead>
<tr>
<th>Clinical presentation</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal discomfort</td>
<td>11 (39.2)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>6 (21.4)</td>
</tr>
<tr>
<td>Incidentally</td>
<td>10 (35.7)</td>
</tr>
<tr>
<td>Jaundice</td>
<td>1 (3.6)</td>
</tr>
</tbody>
</table>

Figure 1: Ultrasound appearances of hepatic hemangioma. (a) Transverse section of liver showing heterogeneous hyperechoic lesion in the right lobe, (b) multiple small hemangiomas in the right lobe, (c) atypical hemangioma with echogenic border with isoechoic center and (d) isoechoic lesion with peripheral calcification.
Twenty-one (76%) cases appeared as hyperechoic (heterogeneously hyperechoic, hyperechoic, hypoechoic with hyperechoic rim, and echogenic), 4 (14%) as heterogeneous, and 3 (10%) as hypoechoic in echogenicity. Most of the lesions showed no-to-minimal vascularity. Mild vascularity was seen in only 3 (11%) cases. Most of the lesions were not associated with any other condition. Only in 4 (15%) cases, hepatic cysts were detected.

**CECT Features (Figure 2)**

On CECT, solitary lesion was seen in 10 (35.7%) cases, 2 to 3 lesions were seen in 13 (46.5%) cases and ≥4 lesions were seen in 5 (17.9%) cases. Twenty-one (72.4%) cases appeared as hypodense and 27 (93.1%) cases showed progressive centripetal gradual filling with delayed persistent of contrast of typical giant hemangioma. One case showed peripheral contrast enhancement with delayed persistent of contrast as of atypical giant hemangioma (hyalinized hemangioma) and 1 case showed early homogeneous contrast enhancement with rapid washout of contrast as a feature of hepatocellular carcinoma.

Few, discrete calcifications were seen in 2 cases, and in 1 case, few, central, scattered cystic changes were seen. These calcification and cystic changes were suggestive of atypical findings.

Hepatic cysts were found in 5 (18%) cases and cholelithiasis and fatty liver were seen in 2 (7%) cases each.

On comparing USG findings with CECT, 18 cases (GH) and 3 cases (AGH) were correctly diagnosed as giant hemangioma. Two cases each were misdiagnosed as hepatocellular carcinoma and metastasis on USG. One case each was misdiagnosed as hepatic abscess, focal nodular hyperplasia, and hepatic adenoma. The detection rate of USG for giant hemangioma including atypical and typical is 71.4%.

**MRI Features (Figure 3)**

MRI was not done in all patients. It was done in 4 cases only. MRI showed T1-weighted (T1W) images as hypo- and iso-intense in 2 cases each, T2W images appeared as hyperintense in all 4 cases, and T1W contrast sequence showed progressive centripetal gradual contrast filling in all the 4 cases.

**DSA (Figure 4)**

Twenty-five cases (89.28%) showed vascular supply from only hepatic artery (Figure 4). Two cases (7.1%) showed add-on vascular supply from aberrant hepatic artery, branch from superior mesenteric artery, and 1 case showed add-on vascular supply from the branch of inferior phrenic artery.

Figure 2: Computed tomography (CT) appearances of hepatic hemangioma. Axial section plain CT (a) Showing large hypodense lesion in the right lobe of liver, portal venous-phase CT, (b) showing typical giant hemangioma with peripheral puddling of contrast, delayed-phase CT, (c) showing delayed centripetal enhancement with central non-enhancing areas (*) consistent with central fibrous scar

Figure 3: Magnetic resonance imaging (MRI) appearances of giant hepatic hemangioma. Unenhanced T1-weighted (T1W) MRI (a) Showing large iso- to hypo-intense mass in the right lobe of liver. Axial T2W MRI (b) showing intermediate signal intensity with central loculation of higher signal intensity (*) corresponding to central scar. Gadolinium-enhanced T1W MRI (c) showing peripheral nodular puddling with progressive centripetal enhancement

DSA procedure was performed well in almost all patients. Six cases (21.4%) complained of fever and pain as immediate complications (within 6 days following procedure), 4 cases (14.2%) complained of distention of abdomen, and 4 cases showed rise in leukocyte count. Puncture site hematoma occurred in 1 case. Twenty-seven cases (96.4%) showed no significant complications on long-term follow-up (FU). One case showed abscess formation in giant hemangioma.

Table 2 shows significant rise in platelet count before and after the TAE procedure ($P = 0.0006$).
Tables 3 and 4 and Chart 1 show comparison and interpretation of average size of lesion at pre-TAE and 3- and 9-month FU on CECT in the right and left lobes of the liver. It shows significant reduction in the size of lesion \( (P < 0.0001 - \text{highly significant [HS]}) \) from 8.97 ± 4.95 cm to 7.48 ± 4.34 cm and 6.41 ± 3.60 cm at 3- and 9-month FU, respectively, in the right lobe of the liver. Similar significant reduction in the size of lesion \( (P < 0.0001 - \text{HS at 3-month FU and } P < 0.0004, \text{HS at 9-month FU}) \) noted in the left lobe of liver from 4.13 ± 4.80 cm to 3.46 ± 4.10 cm (3-month FU) and 3.05 ± 3.41 cm (9-month FU) (Figure 5).

Table 3 and 4 show comparison and interpretation of average size of lesion at pre-TAE and 3- and 9-month FU on USG in the right and left lobes of the liver. It shows significant reduction in the size of lesion \( (P < 0.0001 - \text{HS from 9.7 ± 5.29 to 7.66 ± 4.18 cm and } 6.39 ± 3.50 \text{ cm at 3- and 9-month FU, respectively, in the right lobe of liver. Similar significant reduction in the size of lesion } (P < 0.0105 - \text{significant at 3-month FU and } P < 0.0032 - \text{HS at 9-month FU}) \) noted in the left lobe of liver from 3.82 ± 5.46 to 3.45 ± 4.07 cm (3-month FU) and 3.01 ± 3.44 cm (9-month FU).

Table 5 shows the comparison of appearance of lesion on USG on pre-TAE, 3 months following post-TAE, and 9 months following after TAE. Most of the patients, before TAE, are heterogeneously hyperechoic (45%), heterogeneous (25%), and hypoechoic with hyperechoic rim (14%). Following 3 months after the procedure, overall echogenicity of the lesions decreased on USG. Nearly 71.4% of lesions were found echogenic at 3-month FU. Following 9 months after the procedure, echogenicity again decreased. Most of the lesions, i.e., 92.8% became hypoechoic after 9 months following the procedure.

**DISCUSSION**

This study was designed to determine safety, feasibility, and efficacy of TAE and radiological features of giant hemangioma of liver. In this observational study, the total number of patients was 28 of which 19 were females and 9 were females, with female-to-male ratio of 2:1. The most common age group observed was 31-50 years, with a mean age of 42.10 years and more common in females with female-to-male ratio of approximately 2:1, which is in concordance with studies by Gandolfi et al. and Ng et al.

Twenty-eight patients underwent imaging investigations such as USG, CT scan, and MRI for the diagnosis of giant hemangioma. Then, fluoroscopic-guided hepatic artery embolization was done using transcatheter transfemoral approach after the patients gave written consent for the procedure and after thorough patient preparation was done as described previously in “materials and methods” section.
Permanent embolizing materials, PVA particles, were used in all patients. The patients were also explained in their own language the type of procedure including risks and complications which may arise after the procedure. Patients with normal parameters were included in the study and those patients with abnormal parameters were included after treating them for the same.

A total of 28 procedures were done in this study. The patients were followed up for up to 9 months clinically, using USG and CT scans for statistical analysis.

TAE in giant hemangioma of liver as emphasized by studies in Table 8 can be concluded as follows:

1. Symptomatic improvement was documented in all patients after embolization with significant reduction in the mean size of the tumor on FU radiologic examinations.\textsuperscript{11,15}

2. The use of embolization for hepatic hemangiomas provides safe and effective treatment of the patient's symptoms, valuable in inoperable tumors and complicated cases while avoiding operative intervention, extended hospitalization, or postoperative recuperation.\textsuperscript{18,21,22}

3. However, Srivastava \textit{et al.},\textsuperscript{16} Mohan \textit{et al.},\textsuperscript{23} and Tarazov and Polysalov\textsuperscript{20} could not show any significant changes in tumor size after TAE performed on 8, 1, and 4 patients, respectively.

4. Granov \textit{et al.}\textsuperscript{19} found that symptomatic relief occurred in 2 patients only, more ever it got worsen in 4 of 14 asymptomatic patients, and on 1-year FU, reduction in tumor size was noted in only 1/3\textsuperscript{rd} of patients.

Taking the above dilemma into considerations, we decided to evaluate the utility, adequacy, and efficacy of TAE in giant hemangioma of liver.

**Clinical Presentation**

In the present study, most of the patients were symptomatic (64.3%), presented with discomfort and fullness of abdomen (39.2%), abdominal pain (21.4%), and with jaundice (3.6%). Around 35.7% of patients presented incidentally, out of which 5 patients had hepatomegaly and palpable mass.

According to Gandolfi \textit{et al.},\textsuperscript{12} eight of the 17 patients with giant hepatic hemangiomas were symptomatic (47%). Seven reported discomfort and feeling of fullness and one patient presented with jaundice. The other nine patients were

### Table 5: Comparison of size of lesions at pre-TAE and 3- and 9-month FU on ultrasound

<table>
<thead>
<tr>
<th>Site of lesion</th>
<th>Pre-TAE</th>
<th>3-month FU</th>
<th>9-month FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right lobe</td>
<td>9.7±5.29</td>
<td>7.66±4.18</td>
<td>6.39±3.50</td>
</tr>
<tr>
<td>Left lobe</td>
<td>3.82±5.46</td>
<td>3.45±4.07</td>
<td>3.01±3.44</td>
</tr>
</tbody>
</table>

TAE: Transarterial embolization, FU: Follow-up

### Table 6: Evaluation of change in the size of lesion at pre-TAE, 3-and 9-month FU on USG

<table>
<thead>
<tr>
<th>Statistical value</th>
<th>Right lobe</th>
<th>Left lobe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-TAE-3-month F/U</td>
<td>Pre-TAE-9-month F/U</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>2.03±4.18</td>
<td>3.30±2.24</td>
</tr>
<tr>
<td>\textit{t} value/Z value</td>
<td>5.6875</td>
<td>7.7877</td>
</tr>
<tr>
<td>\textit{P} value</td>
<td>&lt;0.0001, HS</td>
<td>&lt;0.0001, HS</td>
</tr>
</tbody>
</table>

USG: Ultrasound, TAE: Transarterial embolization, FU: Follow-up
asymptomatic at the first examination, although five had clinically evident hepatomegaly, and in two, an abdominal mass was palpable.

In a study by Schwartz and Husser,\textsuperscript{24} 19 out of 28 patients had significant abdominal pain (67%). In eight patients, hepatic mass was palpable.

In a study by Ho \textit{et al}.\textsuperscript{25} 36 out of 61 patients were symptomatic (59%). The present study is comparable with the study of Schwartz and Husser and Ho \textit{et al}.\textsuperscript{25}

The present study shows that lesions are solitary in 46% of cases and having predilection for right lobe (89%) which is comparable with a study done by Sun \textit{et al}. as shown in Table 9.

We observed that most of cases are hyperechogenic in appearance (76%) which is comparable with the study of Gandolfi \textit{et al}. as shown in Table 10.

According to Machado \textit{et al}.\textsuperscript{26} Toro \textit{et al}.\textsuperscript{27} and Sun \textit{et al}.\textsuperscript{11} giant hemangioma appears as well-defined, heterogeneous, hyperechoic mass with posterior acoustic enhancement on posterior wall. Some lesions have hypoechoic center in comparison to peripheral rim. Color Doppler USG showed no-to-minimal flow in most of the hemangiomas. Some hemangiomas had unusual findings as cysts or calcifications within. Hemangiomas do not present with any hypoechoic halo around the lesion. These findings are comparable with the present study.

No significant complications were noted in the present study. Post-embolization syndrome in the form of fever and leukocytosis was relieved after symptomatic treatment. Abdominal distention and liver pain occurred in 14% patients, it may be due to embolization of tumor vessels, drug action, and ischemia. On long-term FU, abscess formation occurred in 1 patient.

Immediate complication rate was 46% in the present study which is comparable with a study done by Sun \textit{et al} as shown in Table 11.
Platelet Count
Giant hemangioma is believed to cause platelet sequestration within tumor resulting in hemorrhagic diathesis named as Kasaback–Merritt syndrome (consumptive coagulopathy).

Studies shown in Table 12 show significant increase in platelet count after treatment of giant hemangioma by any means which suggests that giant hemangioma is responsible for platelet sequestration. The present study shows significant rise in platelet count ($P = 0.0006$).

Srivastava et al., Deutsch et al., and Mohan et al. studied that TAE is a safe and effective therapy for hemangiomas, however no significant change in tumor size was noted.

Zeng et al., Firouznia et al., Sun et al., and Panis et al. found significant reduction in tumor size of all patients and symptomatic relief in almost all patients.

In the present study, we found significant reduction in tumor size and symptomatic relief in all the 28 patients.

The present study is comparable with studies done by Firouznia et al. and Sun et al., as shown in Table 13.

CONCLUSIONS
1. In the prospective and retrospective study carried out on 28 patients, the detection rate of ultrasound and CT

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Table 9: Studies on average number and size of hepatic hemangiomas

<table>
<thead>
<tr>
<th>Authors/year</th>
<th>Number of cases</th>
<th>Single lesion (%)</th>
<th>Multiple lesion (%)</th>
<th>Number of cases (%)</th>
<th>Average size (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gandolfi et al. 1991</td>
<td>123</td>
<td>93 (75)</td>
<td>30 (25)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ho et al. 2012</td>
<td>61</td>
<td>44 (72)</td>
<td>17 (28)</td>
<td>24 (57)</td>
<td>26 (60)</td>
</tr>
<tr>
<td>Sun et al. 2015</td>
<td>27</td>
<td>10 (37)</td>
<td>17 (63)</td>
<td>13 (96)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Present study</td>
<td>28</td>
<td>13 (46)</td>
<td>15 (53)</td>
<td>14 (89)</td>
<td>3 (50)</td>
</tr>
</tbody>
</table>

Table 10: USG features

<table>
<thead>
<tr>
<th>Authors/year</th>
<th>Number of cases</th>
<th>USG appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hyperechoic (%)</td>
<td>Hypoechoic (%)</td>
</tr>
<tr>
<td>Gandolfi et al. 1991</td>
<td>123</td>
<td>84.8</td>
</tr>
<tr>
<td>Present study</td>
<td>22</td>
<td>21 (76)</td>
</tr>
</tbody>
</table>

USG: Ultrasound

Table 11: Incidence of post-procedural complications

<table>
<thead>
<tr>
<th>Authors/year</th>
<th>Number of cases</th>
<th>Complications (cases)</th>
<th>Immediate complications</th>
<th>Long-term complications</th>
</tr>
</thead>
</table>
|                              |                 |                       | Fever | Pain | Leukocytosis | Distention | Puncture site hematoma | Abscess | No | No | 1-
| Panis et al. 1993             | 1               | 1                     | 1     | 1    | -           | -         | -                      | Abscess | No |
| Vassiou et al. 2007           | 1               | 1                     | -     | 1    | -           | -         | -                      | No      | No |
| Mohan et al. 2007             | 1               | 1                     | 1     | 1    | -           | -         | -                      | No      | No |
| Firouznia et al. 2014         | 20              | 1                     | 1     | 1    | 1           | 1         | -                      | No      | No |
| Sun et al. 2015               | 27              | 18 (66%)              | 12    | 5    | -           | 6         | -                      | No      | No |
| Present study                 | 28              | 13 (46%)              | 6     | 6    | 4           | 4         | 1                      | 27-No   | 1-Abscess |

Table 12: Platelet count

<table>
<thead>
<tr>
<th>Authors/year</th>
<th>Number of cases</th>
<th>Pre-treatment platelet count</th>
<th>Treatment plan</th>
<th>Post-treatment platelet count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longeville et al. 1997</td>
<td>1</td>
<td>46,000/mm$^3$</td>
<td>Orthotopic liver transplant</td>
<td>Normal</td>
</tr>
<tr>
<td>Hochwald and Blumgart 2000</td>
<td>1</td>
<td>92,000/mm$^3$</td>
<td>Enucleation</td>
<td>Normal</td>
</tr>
<tr>
<td>Fung et al. 2003</td>
<td>1</td>
<td>99,000/mm$^3$</td>
<td>TAE with PVA particles</td>
<td>151,000/mm$^3$</td>
</tr>
<tr>
<td>Aslan et al. 2009</td>
<td>1</td>
<td>20,000/mm$^3$</td>
<td>Enucleation</td>
<td>Normal</td>
</tr>
<tr>
<td>Present study</td>
<td>28</td>
<td>Mean-2,10,500/mm$^3$</td>
<td>TAE with PVA particles</td>
<td>Mean-2,33,678/mm$^3$</td>
</tr>
</tbody>
</table>

TAE: Transarterial embolization, USG: Ultrasound, PVA: Polyvinyl alcohol.
was 71.4% and 96.5%, respectively. Hence, USG and CT are good modalities for diagnosing giant hepatic hemangiomas.

2. As there were good results in the form of symptomatic relief and reduction in the size of lesions, TAE is effective in the management of patients with giant hepatic hemangiomas.

3. Thus, to conclude, TAE in giant hepatic hemangiomas is safe, feasible, efficient, minimally invasive with good patient acceptance, with minimal complications, and no mortality. Hence, transcatheter arterial embolization should be performed in the management of giant hepatic hemangiomas.

REFERENCES


5. Gaur, et al.: Embolization in Hepatic Hemangiomas

Table 13: Post-TAE clinical and radiological FU

<table>
<thead>
<tr>
<th>Authors/year</th>
<th>Number of cases</th>
<th>Pre-TAE mean size (cm)</th>
<th>Post-TAE mean size (cm)</th>
<th>P value</th>
<th>Symptomatic relief</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3 months</td>
<td>9 months</td>
<td>12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panis et al.</td>
<td>25</td>
<td>1</td>
<td>17.5</td>
<td>-</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td>8</td>
<td>9.28±5.13</td>
<td>-</td>
<td>No significant change in size</td>
<td>-</td>
</tr>
<tr>
<td>Srivastava et al.</td>
<td>18</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>24</td>
<td>9.7±2.3</td>
<td>-</td>
<td>5.6±1.6</td>
<td>3.0±1.2</td>
</tr>
<tr>
<td>Deutsch et al.</td>
<td>18</td>
<td>98</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>20</td>
<td>9.7</td>
<td>-</td>
<td>8.89</td>
<td>-</td>
</tr>
<tr>
<td>Zeng et al.</td>
<td>14</td>
<td>27</td>
<td>11.24±5.08</td>
<td>8.95±4.3</td>
<td>7.6±3.9</td>
<td>-</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>1</td>
<td>12.5</td>
<td>-</td>
<td>12.3</td>
<td>-</td>
</tr>
<tr>
<td>Mohan et al.</td>
<td>15</td>
<td>20</td>
<td>9.7</td>
<td>-</td>
<td>8.89</td>
<td>-</td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td>27</td>
<td>11.24±5.08</td>
<td>8.95±4.3</td>
<td>7.6±3.9</td>
<td>-</td>
</tr>
<tr>
<td>Present study</td>
<td>28</td>
<td>28</td>
<td>Right lobe-8.9±4.9</td>
<td>Right lobe-7.4±4.3</td>
<td>Right lobe-6.4±3.6</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28</td>
<td>Left lobe-4.1±4.8</td>
<td>Left lobe-3.4±4.1</td>
<td>Left lobe-3.0±4.3</td>
<td>-</td>
</tr>
</tbody>
</table>

*Alternative to major liver resection, preferred over hepatic artery ligation and radiotherapy. **Useful therapy in symptomatic hemangioma. ***Useful therapy in symptomatic hemangioma. ****Useful therapy in symptomatic hemangioma. *****Safe and efficient for treating hemangiomas; however studies with larger sample size are required. *******TAE is safe and effective, and alternative to surgery. TAE: Transarterial embolization, FU: Follow-up.


Source of Support: Nil, Conflict of Interest: None declared.
Retrospective Analysis of Thyroidectomy Cases in a Tertiary Care Hospital

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Abstract

Introduction: The incidence of thyroid disorders is on the rise. The preferred treatment for most of the thyroid conditions is total thyroidectomy. The associated complications are transient hypocalcemia, recurrent laryngeal nerve palsy, and postoperative hematoma.

Objective: The objective of this study is to find out the causes of thyroidectomy and their post-operative complications.

Materials and Methods: This is a retrospective study conducted over a period of one year at Department of General Surgery, Government Theni Medical College and Hospital, Theni.

Results: The rates of thyroidectomy are increasing. They are common among women and mostly following Graves disease, nodular goiter, and malignancy. Subtotal thyroidectomy has decreased hypoparathyroidism or nerve injury. However, second look surgeries in cases of recurrence has significantly increased complication rate. Total thyroidectomy is a safe and effective alternative when performed skillfully.

Key words: Goiter, Malignancy, Thyroid, Thyroidectomy

INTRODUCTION

The incidence of thyroid disorders has risen by 20% over the past decade. It is an endocrine organ that produces hormones to regulate metabolic activities of the body. Thyroid disorders could be Benign: thyroiditis, goiter, thyroid adenoma, or malignant. The management is by thyroidectomy which requires careful ligation of superior and inferior thyroid artery to prevent damage of nerves. Despite complications, total thyroidectomy is still preferred as it reduces recurrence. There are controversies regarding the safety of the procedure, amount of gland to be resected, fear of morbidity associated with thyroidectomy. Addressing these becomes important as thyroidectomy procedures are being performed routinely nowadays. With increasing rates of thyroidectomy surgeries and their possible complications, this study was undertaken to evaluate the common causes for the surgery and their associated morbidity.

MATERIALS AND METHODS

This is a retrospective analytical study conducted at the Department of General surgery, Government Theni Medical College. The study was conducted over 1 year from January 2016 to December 2016. The study group included patients who were admitted with thyroid disorders. Patients who had swelling of the neck due to other causes were excluded from the study after confirming the diagnosis.

These patients were evaluated with a detailed history, thyroid profile, history of drug intake, history of previous surgeries or radiation, imaging studies of the neck, fine needle aspiration cytology of thyroid swelling, and complete hemogram. After evaluation, patients requiring surgery were assessed for fitness for surgery; informed written consent was obtained and proceeded with surgery. Specimen sent for histopathological confirmation of diagnosis. They were followed up till their discharge
and reviewed at outpatient department. They were also advised thyroid supplementation or suppressive therapy as required.

**RESULTS**

During the study period, a total of 86 patients were admitted with complaints of neck swelling. On evaluation, 80 of them had thyroid disorders, and 73 cases were managed with thyroidectomy (Tables 1-5).

**DISCUSSION**

Thyroid gland disorders are a challenge to management medically or surgically. The common diseases affecting thyroid gland are goiter, hypothyroidism, hyperthyroidism, thyroiditis, malignancy. The preferred surgical management for these conditions would be total thyroidectomy. Among various thyroidectomy procedures, 40% are done for malignancy and 60% are done for benign conditions. The malignancies that are commonly encountered are papillary carcinoma of thyroid in about 80% cases. The other malignancies are follicular carcinoma, anaplastic carcinoma, and small cell carcinoma.

Nearly, 67% of thyroidectomies were performed on women. This is similar to Der et al. study which showed increased incidence among women.

Katz and Bronson study showed that the indications for thyroid disorders were 19% Graves disease, 62% nodules, 19% malignancy of thyroid gland like papillary carcinoma, medullary carcinoma, follicular carcinoma, and anaplastic carcinoma. Similarly, in our study, the indication for thyroidectomy was Graves’ disease in 15%, nodular goiter in 56%, malignancy in 17%, thyroiditis in 12%.

In our study, the incidence of hypoparathyroidism following thyroidectomy is 5%. This is found to be significantly higher as compared to Gough and Wilkinson’s study had incidence of 0.7% hypoparathyroidism and 2.2% recurrent laryngeal nerve palsy following total thyroidectomy. Jessie and Harrison study had 5-71% incidence of transient hypoparathyroidism and 0-3.5% of permanent hypoparathyroidism.

Thyroidectomy surgeries are the most common cause of vocal cord injury. This occurs due to temporary (15.5-23.6%) or permanent (2.6-15.5%) damage to the recurrent laryngeal nerve. In our study, the nerve injury occurred in 2% patients. To avoid the risk of damage, accurate exposure of nerve by careful dissection is necessary. Comparatively, the risk of hypoparathyroidism and recurrent laryngeal nerve palsy are common with total thyroidectomy. Nerve injury when temporary has a rapid recovery which is beneficial for the patient. Nerve injury could be due to other causes such as use of laryngoscope during intubation, pressure caused by a cuffed tube, overstretching of the nerve while positioning the patient with hyperextended neck. These factors also need to be addressed to reduce the nerve damage.

All patients operated with thyroidectomy were discharged in good condition. There were no post-operative deaths. This shows that thyroidectomy is a safe and effective procedure when performed cautiously.

Subtotal thyroidectomy has reduced incidence of complications but increased risk of recurrence. As
complications are more common in second-look surgeries, it is preferable to perform total thyroidectomy.

**CONCLUSION**

Thyroid disorders are commonly manifesting endocrine disorders among South Indian population. As a result, the total thyroidectomy rates are on the rise. This is a safe and effective procedure when performed by expert surgeon. In subtotal thyroidectomy, the risk of recurrence outweighs the reduced rate of complications.

**REFERENCES**


How to cite this article: Karthikeyan P, Muthu S. Retrospective Analysis of Thyroidectomy Cases in a Tertiary Care Hospital. Int J Sci Stud 2017;5(1):50-52.

Source of Support: Nil, Conflict of Interest: None declared.
Effect of Intrathecal Dexmedetomidine on Shivering in Patients Undergoing Transurethral Resection of the Prostate Surgery under Subarachnoid Block

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Abstract

Background: Shivering is a frequent complication of urological procedures done under regional anesthetics, especially in transurethral resection of the prostate (TURP) because of absorption of large volume of irrigating fluids. Various adjuncts have been used with local anaesthetics in spinal anesthesia to decrease the incidence of shivering among which dexmedetomidine has promising results.

Aim: To compare the efficacy of dexmedetomidine and fentanyl on intraoperative shivering and post-operative analgesia in patients undergoing TURP surgeries under subarachnoid blockade (SAB).

Materials and Methods: This prospective, randomized double-blind study included 60 patients undergoing elective TURP surgeries under SAB and were allocated into two groups: Group F - injection bupivacaine 2 ml 0.5% (10 mg) with 25 µg of fentanyl (0.5 ml) and Group D - injection bupivacaine 2 ml 0.5% (10 mg) with 5 µg of dexmedetomidine totally made to 2.5 ml. Hemodynamic parameters, shivering score, degree of sedation, and any adverse effects were recorded.

Results: The shivering score was less and the time taken for rescue analgesia was more in group D than group F. Bradycardia was observed in three patients (7.5%) in group D which was statistically insignificant (P = 0.241), whereas no patients had bradycardia in group F. Incidence of hypotension was similar in both groups and statistically insignificant (23 in group F versus 24 in group D [P = 0.820]). One more finding was observed that the incidence of sedation was more in group D which was statistically significant (P <0.0001).

Conclusion: To conclude the use of 5 µg of dexmedetomidine to bupivacaine intrathecally is more effective in controlling shivering than fentanyl and also prolongs the duration of post-operative analgesia.

Key words: Bradycardia, Dexmedetomidine, Sedation scores, Shivering, Subarachnoid block

INTRODUCTION

Shivering is a frequent complication of subarachnoid blockade (SAB).¹ The incidence of shivering has been reported to be about 35-85% after spinal anesthesia (SA). It is more common in transurethral resection of the prostate (TURP) which may be due to absorption of large volume of irrigating fluid at room temperature.² Shivering may occur as a response to hypothermia, or it can occur in normothermic patients because SA impairs thermoregulation by inhibiting tonic vasoconstriction below the level of anesthesia through sympathetic and somatic neural blockade.³ With internal redistribution of heat from core to periphery, the loss of thermoregulatory tonic vasoconstriction results in increased heat loss from body surfaces in excess of heat production. Shivering causes patient discomfort, interruption of monitoring, increases O₂ consumption and CO₂ production, and catecholamine secretion that increase cardiac output, heart rate (HR), and blood pressure.
Many medications were tried to prevent or reduce shivering, but the ideal one is still to be determined yet. Meperidine, MgSO₄, ketamine, fentanyl, and morphine have been tried with no convincing results. Dexmedetomidine is an S-enantiomer of medetomidine with a higher specificity for α-adrenoceptor (α₂:α₁, 1620:1) compared to clonidine (α₂:α₁, 220:1). It is highly selective α₂ adrenergic agonist possessing hypnotic, sedative, anxiolytic, sympatholytic, opioid-sparing, and analgesic properties without producing significant respiratory depression. It acts by inhibiting the release of norepinephrine at locus coeruleus. Small doses of dexmedetomidine (3 µg) used in combination with spinal bupivacaine produce a quicker onset of motor block and a prolongation in the duration of motor and sensory block with preserved hemodynamic stability and minimal side effects. The enhanced antinociceptive effect is said to be related to its lipophilicity. It also decreases the shivering threshold. Premedication with intramuscular (IM) dexmedetomidine reduces the incidence of post-operative shivering.

**Aim**

To compare the efficacy of dexmedetomidine and fentanyl on intraoperative shivering and post-operative analgesia in patients undergoing TURP surgeries under SAB.

**MATERIALS AND METHODS**

A prospective comparative study was done in Madras Medical College hospital, Department of Anaesthesiology. Institutional Ethics Committee approval and written informed consent were obtained. 60 patients aged 50-70 years, American Society of Anesthesiologists Physical Status 2 and 3 scheduled for elective TURP surgery under SA, were enrolled in this study. Transrectal ultrasound was done for all patients for detection of prostatic size. Exclusion criteria were patient refusal, allergy to local anaethetics, coagulopathy, systemic or local sepsis, vertebral abnormalities, Parkinson's disease, and patients receiving vasodilators. Patients with unstable CAD and second- and third-degree heart block were also excluded from the study. Under strict aseptic precautions, SAB was performed. Patients were randomly allocated by the use of sealed envelope assignment into two groups; group F patients received - injection bupivacaine 2 ml 0.5% (10 mg) with 25 mic of fentanyl (0.5 ml) made to 2.5 ml and Group D - injection bupivacaine 2 ml 0.5% (10 mg) with 5 mic of dexmedetomidine made to 2.5 ml. The study medications were prepared by a different anaesthesits, and data measurements and recording were carried out by different anaesthesists. Supplemental O₂ (5 L/min) was delivered during surgery. The sensory and motor dermatome levels were assessed and recorded. Sedation was assessed at 15 minutes interval intraoperatively using Ramsay sedation score. TURP was performed using a continuous flow resectoscope with monopolar cautery using glycine 1.5% as an irrigating solution.

During surgery, shivering score was assessed and recorded at 15 min intervals (Table 1). If shivering score was P3, injection tramadol 25 mg was administered intravenously. Any adverse effects such as bradycardia, hypotension, nausea, and vomiting were recorded. Bradycardia was defined as a decrease in HR 50 beats/min. Bradycardia was treated with intravenous (IV) bolus of atropine 0.6 mg. Hypotension was defined as a decrease in mean arterial blood pressure (MAP) of more than 20% from baseline and was treated with IV boluses of ephedrine 3-6 mg. HR, MAP, oxygen saturation, core body temperature, and shivering scores were recorded in all patients at 15 minutes interval over one hour postoperatively. Pain was assessed by verbal rating scale (VRS) at 2nd, 4th, 6th, and 10th h postoperatively. At VRS >4, injection tramadol 50 mg IM was given and the time of rescue analgesia was also noted. Anesthesia time, surgery time (resection time), and any adverse events were also recorded.

**RESULTS**

Demographic characteristics of two groups were found no difference (Table 2). Patients in dexmedetomidine group shivered less (Grade 0 in 30 patients in group D versus 16 patients in group F and Grade 1 in 7 patients in group D versus 12 patients in group F). Shivering Grade 3 occurred in one patient in group D and four patients in group F and received injection tramadol 50 mg IM and no patients had Grade 4 shivering (Table 3). Bradycardia was observed three patients (7.5%) in Group D and received injection atropine 0.6 mg, whereas no patients had bradycardia in group F. Incidence of hypotension was similar in both groups (23 in group F versus 24 in Group D and all patients were managed with injection ephedrine 3/6 mg and there was no further hypotension in those patients. Sedation scores were higher in Group D. Score was 1 in 15 patients and 2 in 24 patients in Group D, whereas score was 1 in 13 patients and 2 in 16 patients in Group F (Table 4). Incidence of side effects such as nausea, vomiting, hypotension, bradycardia, and shivering were noted (Table 5).

The time of demand analgesia was also noted among study group, in which Group D had a more prolonged duration of post-operative analgesia (11 h ± 1.5), whereas in Group F, the time for demand analgesia was 5.5 h ± 1 and they were treated with injection tramadol 50 mg IM.
DISCUSSION

The thermoregulatory mechanism in human body is a complex one that normally keeps the temperature within a tight range (36.5-37.5°C) known as “inter-threshold range.”9 If the core temperature decreases below that range, the body responds by vasoconstriction and shivering which increases heat production two-to-five folds.10 Thus, shivering is a protective mechanism to preserve body heat, but no definite linear relationship exists between body temperature and occurrence of shivering. SA induces the inhibition of vasoconstriction below the level of anesthesia through sympathetic and somatic blockade with subsequent vasodilatation and increases cutaneous blood flow that results in increasing heat loss through the skin. In contrast to these changes, vasoconstriction and shivering are restricted to the upper body during SA. The exact mechanism of shivering during SA has not been fully established. The possible mechanisms include cessation of central thermoregulation, internal redistribution of body heat, and heat loss to the environment. It increases \( \text{O}_2 \) consumption and \( \text{CO}_2 \) production with a subsequent increase in basal metabolic rate. Shivering interferes with patient’s monitoring, and it may be a problem in old patients who are undergoing TURP as most of them have one or more associated comorbidities with limited cardiac and respiratory reserve. Shivering is mostly a response to hypothermia. However, it may be seen in normothermic patients under SA. Factors which affect the severity of hypothermia in spinal anesthesia are aging, level of sensory block, and temperatures of the local anesthetic, operating room, and IV solutions. Pharmacological therapies such as opioids, tramadol, Physostigmine, clonidine, ketamine, and magnesium sulfate have been used to prevent shivering.9 Meperidine is among opioids, which is extensively studied due to its anti-shivering effect. Disadvantages of meperidine include nausea, vomiting, pruritus, and respiratory depression. Fentanyl and morphine could control shivering, but it should be given in large doses to be effective with an increase of the incidence of side effects. Tramadol may cause nausea, vomiting, and respiratory depression during and after SA. The hypertensive and tachycardic effects of ketamine limit its use. MgSO4 also has been tried to control post-operative shivering, but its mechanism of action is uncertain, and also it has side effects such as nausea, vomiting, feeling warm, and flushing; it may induce respiratory depression.11 Dexmedetomidine is a highly selective \( \alpha-2 \) adrenergic receptors agonist.12,13 It has sedative, analgesic, perioperative sympatholytic, anesthetic-sparing, and hemodynamic-stabilizing properties. It is highly lipophilic, the fact that may facilitate its rapid absorption into the cerebrospinal fluid and binding to the spinal cord \( \alpha-2 \) adrenergic receptor.14 The effect of the spinal anesthesia has been reported to be prolonged by the addition of dexmedetomidine with less hypotensive effect and an added sedative effect without respiratory depression.15,16 Activation of \( \alpha-2 \) adrenergic receptors in the brain and spinal cord by dexmedetomidine decreases

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Table 1: Shivering classification by Crossley and Mahajan scale⁸

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No shivering</td>
</tr>
<tr>
<td>1</td>
<td>Cyanosis and piloerection</td>
</tr>
<tr>
<td>2</td>
<td>Visible tremors in one muscle group</td>
</tr>
<tr>
<td>3</td>
<td>Visible tremors in more than one muscle group</td>
</tr>
<tr>
<td>4</td>
<td>Intense shivering and tremors of head and arm</td>
</tr>
</tbody>
</table>

Table 2: Distribution of study patient’s characteristics

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group F</th>
<th>Group D</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>59.40±7.21</td>
<td>65±7.97</td>
<td>0.012</td>
</tr>
<tr>
<td>Prostate size</td>
<td>55.56±5</td>
<td>55.7±6.5</td>
<td></td>
</tr>
<tr>
<td>Anesthesia time (min)</td>
<td>100±6.5</td>
<td>106±7.2</td>
<td></td>
</tr>
<tr>
<td>Surgery time (min)</td>
<td>65±5.4</td>
<td>64±7.8</td>
<td></td>
</tr>
<tr>
<td>Irrigating solution (L/pt)</td>
<td>12±3.5</td>
<td>12±4.5</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Distribution of shivering scores during intraoperative period

<table>
<thead>
<tr>
<th>Shivering score</th>
<th>Group F</th>
<th>Group D</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>20</td>
<td>0.012</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Distribution of sedation scores during intraoperative period

<table>
<thead>
<tr>
<th>Sedation score</th>
<th>Group F</th>
<th>Group D</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>15</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Distribution of adverse events in study patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group F</th>
<th>Group D</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bradycardia</td>
<td>0</td>
<td>3</td>
<td>0.241</td>
</tr>
<tr>
<td>Hypotension</td>
<td>23</td>
<td>24</td>
<td>0.820</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>2</td>
<td>3</td>
<td>0.644</td>
</tr>
<tr>
<td>TURP syndrome</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
</tr>
<tr>
<td>Tramadol administered</td>
<td>4</td>
<td>1</td>
<td>0.615</td>
</tr>
<tr>
<td>Ephedrine administered</td>
<td>22</td>
<td>23</td>
<td>0.822</td>
</tr>
</tbody>
</table>

TURP: Transurethral resection of the prostate
sympathetic tone and attenuates the neuroendocrine and hemodynamic responses to anesthesia and surgery. Thus, dexmedetomidine can mediate both the beneficial and unwanted effects of shivering provoked by hypothermia such as increased catecholamine concentrations, oxygen consumption, blood pressure, and HR.

CONCLUSION

To conclude the use of 5 µg of dexmedetomidine to bupivacaine intrathecally is more effective in controlling shivering than fentanyl and also prolongs the duration of post-operative analgesia.

REFERENCES

Intrathecal Nalbuphine as an Adjuvant to Spinal Anaesthesia: What is Most Optimum Dose?

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Abstract

**Background:** To find out the most effective dose of nalbuphine as an adjuvant to spinal anesthesia. To compare the three different doses and find out most optimum dose of nalbuphine with minimal side effects and maximum analgesic effect.

**Materials and Methods:** We conducted prospective randomized double-blind controlled study with 120 American Society of Anesthesiology I and II patients who were undergoing lower limb orthopedic surgery under spinal anesthesia. We randomly allocated four Groups A, B, and C to receive 0.4, 0.6, and 0.8 mg nalbuphine made up to 0.5 ml with distilled water, and Group D receive 0.5 ml of plain distilled water added to 2.5 ml of 0.5% hyperbaric bupivacaine (3 ml), respectively. The onset of sensory block and motor block, duration of surgery, duration of motor blockade and analgesia, visual analog scale score, vital parameters, and adverse effects compared between these groups.

**Findings:** No difference was noted in the onset of sensory and motor blockade among the four groups. Duration of two-segment regression time of sensory block, duration of motor blockade, and duration of analgesia time were prolonged in Groups B (0.6 mg) and C (0.8 mg) and found to be significant. The incidence of adverse effects was frequently higher in Group C ($P < 0.005$) compared to other groups.

**Conclusion:** Nalbuphine is effective adjuvant in spinal anesthesia, in a dose of 0.6 mg to prolong the duration of analgesia without increased adverse effects.

**Key words:** Hyperbaric bupivacaine, Nalbuphine, Spinal anesthesia

INTRODUCTION

Patients undergone orthopedic procedures have significant pain in post-operative period, if we used bupivacaine alone in spinal anesthesia. Hence, various adjuvants are used along with local anesthetics in neuraxial blockade to prolong the post-operative analgesia. Most commonly used adjuvants are opioids, alpha-2 adrenergic agonist, ketamine, midazolam, etc., but certain side effects such as pruritus, respiratory depression, nausea, vomiting, and urinary retention were observed with opioids. Nalbuphine is semi-synthetic opioid with mixed kappa agonist and µ antagonist properties. Nalbuphine bind to kappa receptors distributed in spinal cord and brain and produce analgesia. Nalbuphine bind to µ receptor helps to dispute to other µ agonist properties, so it produces very minimal side effects. Our study is aimed to find out the optimum dose of nalbuphine to produce significant prolongation in the duration of analgesia without adverse effects.

MATERIALS AND METHODS

Ethical Committee approval and written informed consent were obtained from all patients before going for study. About 120 patients of American Society of Anesthesiology (ASA) I and II, aged 20-60 years, both sexes posted for elective lower limb orthopedic surgery under spinal anesthesia included in the study. Patients were allocated randomly to four groups ($n = 30$). They received nalbuphine 0.4 mg (Group A), nalbuphine 0.6 mg...
(Group B), and nalbuphine 0.8 mg (Group C) made up to 0.5 ml with distilled water added to 2.5 ml (12.5 mg) 0.5% hyperbaric bupivacaine (total volume 3 ml) and plain 0.5 ml distilled water added to 2.5 ml (12.5 mg) 0.5% hyperbaric bupivacaine (total volume 3 ml) is Group D. This study was a double-blind study. Patients with h/o allergy to bupivacaine or ASA III and IV, contraindication to spinal anesthesia, are excluded from the study.

All patients are secured with 18/20 G intravenous cannula. ECG, SPO₂, noninvasive blood pressure (BP) monitor attached before giving anesthesia. Patients preloaded with ringer lactate 15 ml/kg over 10 min. Under aseptic precaution, spinal anesthesia was performed in sitting position at L3-L4/L4-L5 space using 25 G quincke spinal needle. Then, the patient placed in supine position.

Onset of sensory block (time of injection to loss pin prick sensation), onset of motor block (time of injection to complete grade IV block), higher level of sensory block, duration of two-segment regression of sensory block (time of higher level of sensory block to two-segment regression time), duration of motor block (time required for grade IV block to grade I motor block in Bromage scale), duration of analgesia (time of injection subacromial bursa to visual analgesic), duration of analgesia (VAS score >3 or first rescue analgesia requirement) were noted. Intraoperative sedation score by Ramsay sedation score observed. SPO₂, PR, and BP monitor at 0, 2, 5, 10, and 15 min and thereafter every 10 min to end point of the study were noted. Any adverse effects such as hypotension, bradycardia, nausea, vomiting, pruritis, and respiratory depression (SPO₂ <90%) or RR <10/min were noted. Post-operative sensory level, motor block was assessed every 30 min for first 2 h then everyone hour up to end of the study. Pain intensity assessed by VAS scale. All data are analyzed statistically by Student’s t-test, one-way ANOVA and Fisher’s test. P < 0.005 was considered statistically significant.

RESULTS

All groups were comparable in all demographic data such as age, sex, weight, sex ratio, and duration of surgery (Table 1); P > 0.05.

There was statistically insignificant (P > 0.005) in all four groups in the onset of sensory and onset of motor block (Table 2). The higher sensory block was achieved by all groups was between T6 and T8. Two-segment regression time of sensory blockade was progressively prolonged in Groups A, B, and C compared to Group D (Table 2). Group C recorded with a mean of 190.4 min compared with 180.2 min in Group B, in Group A 152.4 min and Group D 116.6 min. The duration of motor blockade also prolonged progressively in Groups A, B, C compared to Group D (Table 2). Group C recorded with the longest duration of motor blockade with a mean of 220.5 min compared to Group B 202.4 min, Group A 188.12 min, and Group D 142.18 min (Table 2). The duration of analgesia was prolonged progressively in Group A, B, C compared to Group D (Table 2). Group C recorded with the longest duration of analgesia with a mean of 280.2 min compared to Group B 260.5 min, Group A 229.5 min, and Group D 168.2 min (Table 2).

The adverse effects of hypotension, bradycardia, pruritis, nausea, vomiting, and respiratory depression are more common in Group C compared to other groups (Table 3).

DISCUSSION

Intrathecal opioids used as adjuvants to neuraxial anesthesia for prolonged the duration of analgesia but intrathecal opioids have some disadvantages such as respiratory depression, pruritis, nausea, and vomiting. To overcome these adverse effects opioids with partial agonist-antagonist action have been studied extensively. Nalbuphine is semisynthetic opioid having agonist activity at kappa receptors and antagonist activity at µ receptor. Analgesic action of nalbuphine produced by kappa receptor, it is present throughout the brain and spinal cord area of involved in nociception. Hence, nalbuphine acts primarily at the level of the first synapse in the nociceptive system in producing analgesia. There are few studies suggest that neuraxial administration of nalbuphine has minimal side effects such as respiratory depression, pruritis, nausea, vomiting, and significant prolonged duration of analgesia.

Culebras et al. are first study used intrathecal nalbuphine for cesarean section patients. In this study, they compared morphine 0.2 mg added to hyperbaric bupivacaine with different dose of intrathecal nalbuphine 0.2, 0.8, and 1.6 mg added to hyperbaric bupivacaine and concluded that nalbuphine 0.8 mg have significant prolonged duration with minimal side effects, but nalbuphine 1.6 mg did not increase efficacy but increased incidence of adverse effects.

Fournier et al. compared between intrathecal nalbuphine 0.4 mg morphine 160 µg in old patients undergoing THR. They concluded that nalbuphine produce faster onset of pain relieving but duration of analgesia shorter than morphine.

Tiwari et al. had compared intrathecal nalbuphine 0.2 and 0.4 mg added to hyperbaric bupivacaine with bupivacaine alone. They concluded that prolonged duration of analgesia was seen in nalbuphine 0.4 mg without adverse effects.
Mukherjee et al. had compared 100 patients undergoing orthopedic lower limb surgeries under spinal anesthesia. They used different doses of nalbuphine 0.2, 0.4, and 0.8 mg added to 0.5% bupivacaine and they concluded that 0.4 and 0.8 mg have significant prolong the duration of analgesia but adverse effect higher with 0.8 mg dose.

We had excluded the 0.2 mg group and 1.6 mg because 0.2 mg group does not show prolonged duration of analgesia and 1.6 mg have increased the adverse effect, and the duration of analgesia was slightly increased compared to 0.8mg. Hence, in this study, we compare nalbuphine 0.4, 0.6, and 0.8 mg added to 0.5% bupivacaine and 0.5% bupivacaine alone, to find out which is most optimum dose.

This study shows that duration of two-segment regression of sensory block, duration of motor block and duration of analgesia all are progressive increase in Group A, B, and C compared to control Group D (Table 2). Our study results are comparable with the previous studies such as Culebras et al., Tiwari et al., and Mukherjee et al.11-13 Nalbuphine 0.6 mg (Group B) significant prolong duration of analgesia with minimal adverse effects (P < 0.005) than nalbuphine 0.8 mg (Group C), while nalbuphine 0.4 mg (Group A) have significant lesser duration of analgesia compared to Group B, C (Table 2). Nalbuphine 0, 8 mg (Group C) have prolonged duration of analgesia (Table 2) but increased adverse effects (Table 3). As regarding neurotoxicity of intrathecal nalbuphine, it used modern day practice more than 10 years without neurotoxicity.14

**CONCLUSION**

We concluded that intrathecal nalbuphine 0.6 mg added to 0.5% hyperbaric bupivacaine for spinal anesthesia in patients undergoing lower limb orthopedic surgeries had prolonged duration of motor block and duration of analgesia without increased adverse effects. Hence, we conclude that 0.6 mg of nalbuphine is better adjuvant to bupivacaine in spinal anesthesia.

**REFERENCES**

Comparative Study on Prevention of Postpartum Hemorrhage by Routine Active Management of Third Stage of Labor versus Active Management of Third Stage of Labor with AMR’S Maneuver in Madurai Medical College, Tamil Nadu, India

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Abstract

Background: Postpartum hemorrhage (PPH) is responsible for around 25% of maternal mortality worldwide (WHO, 2007) reaching as high as 60% in some countries. In resource-poor settings, many uterotonics known to be effective in reducing PPH in tertiary care settings may not be useful in community settings because they require refrigeration and/or skilled administration (Patel et al. 2006). The rationale behind this study is to investigate the applicability and effectiveness of a new simple maneuver in decreasing the rate of PPH and the amount of postpartum blood loss in such setup.

Materials and Methods: This is a prospective comparative study conducted in Government Rajaji Hospital Madurai, Department of Obstetrics and Gynaecology between January 2016 and July 2016. A total of 500 patients eligible for vaginal delivery were divided into 2 groups: Study Group - 250 patients AMR’S maneuver done, by stretching the cervix for 90 s with ovum forceps, with active management of the third stage of labor (AMSTL). Control group - 250 patients with routine AMSTL alone. The amount of blood loss was calculated by under buttock calibrated drape. All patients were followed up for 6 h.

Results: The mean age in the study group was 23.5 years and control group was 23.6 years. Overall 52.5% were primigravida. About 61% belong to normal body mass index. Nearly 59.8% had spontaneous labor. Almost 91% had labor natural. Maximum number of patients had blood loss in the range of 200-400 ml which was 58.8% in the study group and 59.2% in control group. Severe PPH, i.e., >1000 ml did not occur in both groups. The rate of PPH defined as >500 ml was 3.2% in study group and 3.6% in control group. The difference of which is statistically not significant. Mean blood loss in study group is 263.22 ml and in control group is 285.76 ml which is significant. Eight patients had PPH in the study group, and 9 patients had PPH in control group. In PPH range mean blood loss in cases is 615 ml and in controls is 713.3 ml which is also statistically significant. The mean predelivery hemoglobin (Hb) in the study group was 10.44 g and in control group was 10.47 g. Post-delivery fall in Hb was significant in control group but not in study group.

Conclusions: This randomized control study compared routine AMSTL and AMR’S maneuver with AMSTL. The maneuver is found to decrease amount of blood loss due to PPH when done along with the AMSTL.

Key words: Active management of the third stage of labor, AMR’S maneuver, Ferguson reflex, Postpartum hemorrhage

INTRODUCTION

Obstetric hemorrhage is the world’s leading cause of maternal mortality causing 24% of maternal deaths annually (an estimated 127000).¹ Postpartum hemorrhage (PPH) is defined as blood loss of more than 500 ml, and it is the main cause of death due to obstetric hemorrhage.² Incidence of
PPH is found to be about 1-5% of all deliveries. According to a report by the WHO, women in developing countries are more than 40 times likely than women in developed countries to die in childbirth, and PPH is the main cause of maternal mortality in developing countries.

Women who survive PPH experience significant morbidities including severe anemia, problems caused by blood products, intensive care admission, further surgical interventions, infection, and prolonged hospitalization (Zelop 2011). The factors responsible for increased maternal mortality due to PPH in developing countries are conduct of delivery by unskilled workers in more than 50% of deliveries, lack of adequate staff and medicines in health facilities and the difficulty in identification of women prone for PPH (Jhpiego, 2001) as many women develop PPH without any associated risk factors.

Thus, PPH is a complication that needs effective preventive measures that is designed to suit varied needs of women and is possible to execute in a low resource setting. AMSTL reduces PPH risk by reducing postpartum blood loss. Prophylactic uterotonics in the third stage of labor decrease the risk of PPH by 60%. Oxytocin is the drug of choice. Ergometrine decreases risk of minor PPH but should be avoided in patients with hypertension. Misoprostol can be used when oxytocin is not available.

PPH is to be expected to occur in all deliveries, and preventive measures of PPH should be followed after every birth. Women are counseled prenatally to have institutional deliveries or to be delivered by trained health staff. However, in low-resource settings, many uterotonics used in the prevention of PPH may not be useful because they require refrigeration and/or skilled health staff for administration (Patel et al., 2006). The purpose of this study is to find out the applicability and efficacy of a new simple AMR’s maneuver along with AMSTL in reducing the rate of PPH and the amount of blood loss in PPH in such setup.

### MATERIALS AND METHODS

In this randomized comparative study, 500 patients attending Government Rajaji Hospital, Madurai for safe confinement from January 2016 to July 2016 were recruited. They were divided into 2 groups. Study Group: Those patients who received active management of the third stage of labor (AMSTL) with AMR’s maneuver in the third stage of labor. Control group: Those patients who received AMSTL only.

**Inclusion Criteria**

Age more than 18 years, patients eligible for normal labor.

**Exclusion Criteria**

Antepartum hemorrhage in this pregnancy, placenta previa, gestational hypertension, multiple pregnancy, diabetes, severe anemia with hemoglobin (Hb) <8 g, fetal macrosomia >4 kg baby, history of PPH, pre-existing maternal hemorrhagic conditions such as factor 8 or 9 deficiency or von Willebrand disease.

Routine AMSTL is done in control group patients. In study group patients, AMSTL is performed, and after placental delivery, the new maneuver was done by sustained traction of the anterior and posterior lips of the cervix by two ovum forceps for the duration of 90 s. In each patient height, weight, body mass index (BMI), BP, Hb before and 48 h after delivery, spontaneous, induced or accelerated, whether labor natural or instrumental, baby weight, episiotomy given or not, perineal tears present or not, uterus initially flabby or contracted and amount of blood loss were recorded.

**Description of AMR’S Maneuver**

It was observed that after normal vaginal delivery, after delivery of the placenta sustained traction of the anterior and posterior lips of the cervix by ovum forceps for about 90 s leads to marked reduction in the amount of blood loss and significantly decreases the incidence of uterine atony. The traction of the cervix should be sufficient to make the cervix reach the level of the vaginal introitus.

**Mechanism of Action**

It is supposed that the maneuver can be explained by the Ferguson reflex. The continuous stretch applied to the cervix stimulates the stretch receptors which results in the production of oxytocin from the posterior pituitary. Thus, this will result in contraction of the uterine musculature and causes a significant reduction in blood loss after delivery of placenta. Performing this maneuver also causes kinking of the redundant uterine arteries resulting in a decrease of postpartum blood loss. This will allow more suitable conditions for clotting and thrombin formation.

**Measurement of Blood Loss**

The estimation is done after AMSTL in Control group and after removal of forceps in study group. Blood loss was measured with blood collecting drape. Visual estimation which is practiced at present is shown to underestimate blood loss. Hence, it is not optimal for estimation of postpartum blood loss, and this method should be replaced by some objective measurement. This can be done by a sterile under buttock drape. It has a funneled and calibrated collecting pouch attached to a plastic sheet. This is placed under the woman’s buttocks after delivery. All patients were followed up for 6 h.
RESULTS

Baseline Characteristics
In this study, the age group of patients varied from 18 to 35 years. Maximum number of patients belong to the age group 21-25 years. Among parity, the two groups are similar in distribution. Primigravida were more compared to multigravida. This study group had 52.4% primigravida and 47.6% multigravida. Among PPH patients in study group, 62.5% were primi and 37.5% were multi. However, when compared to control group postpartum blood loss was significantly reduced in primigravida when AMR’s maneuver was used in this study in study group. With respect to BMI most of the patients belonged to normal BMI, i.e., <25. The distribution of BMI was same in both groups. In a study by AMR Hamdy, most of the patients belonged to overweight BMI range. (25-29.99). This may be due to change in ethnicity of the study population. Most of the patients had normal progression of labor. There was a significant reduction in postpartum blood loss in patients who underwent labor augmentation with oxytocin when AMR’s maneuver was used. Most of the patients in this study delivered by labor natural. It accounts for 91.2% in study group and 90.8% in control group. In study group 8.8% and in control group 9.2% had instrumental vaginal delivery. There was a significant reduction in postpartum blood loss in patients who underwent labor natural when AMR’s maneuver was used. Table 1 shows baseline characteristics.

PPH
PPH was effectively controlled by a combination of AMR’s maneuver with AMSTL than routine AMSTL alone. Mean blood loss in study group is 263.22 ml and in control group is 285.76 ml. The mean blood loss in study group is significantly lower than in control group. The mean blood loss in no PPH patients in study group is 263.22 ml which is comparable to AMR Hamdy study with mean blood loss of 278.6 ml in no PPH group. There was no severe PPH (>1000 ml). Eight patients had PPH in study group, and 9 patients had PPH in control group. The mean blood loss in PPH patients in study group was 615 ml, and in control group it is 713.3 ml. Hence, the incidence of PPH is almost the same in both groups; however, the amount of blood loss in PPH patients is significantly less in study group than in control group. Moreover with the comparative study, the impact of AMR’s maneuver in decreasing PPH is well observed (Figure 1 and Table 2).

Regarding anemia, nearly, 78% of patients were mildly anemic in both groups. Moderate and severe anemia patients were excluded from the study. The postpartum blood loss in anemic patients was significantly less in study group when compared to control group. Furthermore, the postdelivery fall in hb was present in both groups, but the fall in hb was significant in control group than in study group. Patients who had an episiotomy and those without perineal tears had significantly lesser postpartum blood loss in study group when AMR’s maneuver was used when compared to control group (Figure 2 and Table 3).

Table 1: Routine AMSTL Versus AMSTL with AMR’s maneuver

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group A - AMR’s+AMSTL</th>
<th>Group B - AMSTL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>PPH</td>
</tr>
<tr>
<td>Total number of PPH</td>
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<td>9</td>
</tr>
<tr>
<td>Parity</td>
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<td></td>
</tr>
<tr>
<td>Primi</td>
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<td>5</td>
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<tr>
<td>Multi</td>
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<tr>
<td>BMI category</td>
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<td>Obese Class I</td>
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<td>2</td>
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<tr>
<td>Episiotomy</td>
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</tr>
<tr>
<td>No</td>
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<td>1</td>
</tr>
<tr>
<td>Perineal tears</td>
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<td></td>
</tr>
<tr>
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<td>3</td>
</tr>
<tr>
<td>No</td>
<td>214</td>
<td>5</td>
</tr>
<tr>
<td>Uterine tone</td>
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<td></td>
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<tr>
<td>Firm</td>
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<td>6</td>
</tr>
<tr>
<td>Atonic</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Hb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anemic (&lt;11 G)</td>
<td>194</td>
<td>5</td>
</tr>
<tr>
<td>Not anemic (&gt;11 G)</td>
<td>56</td>
<td>3</td>
</tr>
</tbody>
</table>

AMSTL: Active management of the third stage of labor, PPH: Postpartum hemorrhage, BMI: Body mass index

Table 2: Blood loss

<table>
<thead>
<tr>
<th>Blood loss</th>
<th>Study group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean±SD (ml)</td>
<td>263.22±113.21</td>
<td>285.76±128.49</td>
</tr>
<tr>
<td>P value</td>
<td>0.038 significant</td>
<td></td>
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</tbody>
</table>

SD: Standard deviation

Figure 1: Overall blood loss comparison

![Figure 1: Overall blood loss comparison](image-url)
DISCUSSION

AMR’S maneuver when done along with AMSTL reduces postpartum blood loss more effectively than blood loss in patients in whom only routine AMSTL was done. AMR’S maneuver when added with AMSTL significantly lowers the amount of blood loss in PPH patients thus reducing maternal morbidity. AMR’S maneuver was more effective reducing postpartum blood loss in primigravida, patients who had labor natural, who had an episiotomy and those without perineal tears. The decrease in postpartum blood loss was significant in anemic patients when AMR’S maneuver was used. The post-delivery fall in Hb is significantly lowered when AMR’S maneuver was added to AMSTL. Thus, AMR’S maneuver protects anemic patients from further deterioration. Thus by this study, it is found that the new AMR’S maneuver is an effective and feasible method to reduce PPH in lower source settings.

CONCLUSION

AMR’S maneuver done along with routine AMSTL is an effective method in the prevention of PPH. It reduces the amount of blood loss even when there is a tendency for PPH to occur. It just requires an extra pair of ovum holding forceps in the delivery kit and training the available workforce. Hence, this method is very much suitable in low-resource settings were refrigeration of uterotonics is difficult or workforce to administer intramuscular or intravenous injections is difficult to avail.

REFERENCES

Clinical Study on Interstitial Lung Diseases in a Tertiary Teaching Hospital of North Kerala

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Abstract

Introduction: Interstitial lung disease (ILD) is a group of conditions affecting the lung parenchyma. The American Thoracic Society/European Respiratory Society classified the idiopathic interstitial pneumonias (IIPs) into seven specific entities and offered standardized terminology and diagnostic criteria. Review of literature shows the stress on the necessity of finding a better clinical algorithm in the diagnosis and management of IIPs.

Aim: To study the demography, risk factors, clinical features, laboratory, and radiological investigations in the diagnosis of ILDs in patients attending the tertiary teaching hospital of North Kerala.

Materials and Methods: A total of 82 patients were studied for their demography, risk factors, clinical features, laboratory, and radiological investigations in the diagnosis of ILDs in a tertiary teaching hospital. Laboratory tests, X-ray chest, high-resolution computed tomography (HRCT), pulmonary function tests, 6-min walk test, bronchiolar lavage analysis, and lung biopsy were done. Patients were categorized as autoantibody positive if they had one or more circulating autoantibody levels above the established reference values except antinuclear antibody and rheumatoid factor (RF).

Results: C-reactive protein values in 32 patients (45.07%) showed values of 1.84 ± 4.60 mg/dL. RF values in 11 patients were 102.24 ± 11.25. HRCT in 67 patients showed features of non-specific ILD in 17 and idiopathic pulmonary fibrosis (IPF) in 28. Anti ribonucleoprotein antibody test was negative in 31.37%, borderline in 52.94%, and positive in 15.68%.

Conclusions: IPF was the most common ILD in the study followed by non-specific interstitial pneumonia, desquamative interstitial pneumonia, and cryptogenic organizing pneumonia. Multidiscipline discussion and investigative approach helps in diagnosis and assessing the prognosis of ILD. The inclusion of environmental exposure factors conducted in a prospective method would go a long way to provide further insight into the etiology and diagnoses of ILD.

Key words: High-resolution computed tomography, Idiopathic pulmonary fibrosis, Interstitial lung disease, North Kerala

INTRODUCTION

Interstitial lung diseases (ILDs) are acute and chronic bilateral lung diseases with a heterogeneous group of known and unknown causes. They pose diagnostic and therapeutic challenges to the clinician. Clinicians and patients encountered with ILD are usually frustrated as there is no cause or cure for most of the ILDs. The American Thoracic Society/European Respiratory Society (ATS/ERS) classified the idiopathic interstitial pneumonias (IIPs) into seven specific entities and offered standardized terminology and diagnostic criteria. The “gold standard” need of a histological diagnosis was changed to a multidisciplinary approach. The ATS/ERS update of 2013 classify the IIPs into: (1) Major IIPs: Comprising idiopathic pulmonary fibrosis (IPF), non-specific interstitial pneumonia, respiratory bronchiolitis-ILD (RB-ILD), desquamative interstitial pneumonia, cryptogenic organizing pneumonia, and acute interstitial pneumonias. (2) Rare IIPs: Pleuro - parenchymal fibroelastosis and lymphoid interstitial pneumonia. (3) Unclassifiable IIPs: availability of computed tomography (CT) scans of the chest has resulted in an increased awareness of ILD and the reports of the prevalence of ILD in several countries has increased since then. In India, there are not sufficient data available related to the pattern, determinants, distribution,
and response of treatment of ILD. According to the studies, available proportion of IPF may vary between approximately 30% and 45% of ILDs. The data on diffuse parenchymal lung diseases (DPLD) published by Jindal in 1979 after 5 years of study showed 46% of patients with IPF. Sharma in 1984 showed the presence of IPF in 28.6% of their patients with DPLD. Maheswari et al. published that in their patients, females were more and the mean age was 50 years. Similarly, a group of investigators from South India showed that the secondary DPLD (50.8%) was more common than IPF.

**Aim of the Study**
The aim is to study demography, risk factors, clinical features, laboratory, and radiological investigations in the diagnosis of ILDs in patients attending a tertiary teaching hospital of North Kerala.

**MATERIALS AND METHODS**

A total of 82 patients attending the tertiary Teaching Hospital attached to Kannur Medical College, Anjarakandy, Kannur, Kerala, were included in this study. The study period was between February 2012 and January 2015 (3 years). The total number of outpatients attending the outpatient department of chest diseases during that period was 34928. The demographic data: Age, sex, socio-economic status, presenting complaints, smoking status, environmental/drug exposures, history of tuberculosis (TB), and connective tissue diseases were elicited. Thorough family history and physical examination of the respiratory system were done.

**Inclusion Criteria**

1. Patients presenting with shortness of breath and cough with bilateral basal end inspiratory crepitations
2. X-ray/CT scan abnormalities suggestive of ILD were included in this study.

**Exclusion Criteria**

1. Patients with malignant diseases of the lung are excluded from the study
2. Patients known to have cardiovascular diseases are excluded from the study
3. Acute pulmonary infections were excluded from the study.

The study was approved by the Institution Ethics Committee and an approved consent form was used during the entire study. Laboratory tests used in the workup of the patients were complete blood cell count (CBC), C-reactive protein (CRP), and Mantoux test; rheumatoid factor (RF), antinuclear antibodies (ANA), and anti-U1 ribonucleoprotein (A-RNP) antibodies were done. X-ray chest, high-resolution CT (HRCT) thorax, pulmonary function tests (PFTs), 6-min walk test, bronchoalveolar lavage analysis, and lung biopsy are done in patients depending on the necessity and availability. Serum CRP values above 3.0 mg/dL are taken as abnormal. Serological tests were considered as positive if the results are above the reference values except for ANA for which titers above or at 1:160 were considered positive. A-RNP value <20 U based on enzyme-linked immunosorbent assay (ELISA) was taken as negative; 20-25 U was taken as borderline; a positive serology test for A-RNP is taken when the values are >26 U. The ANA values ≥1:320 and RF ≥60 IU/ml were considered positive. The HRCT findings which were looked for were ground glass opacities (GGO), septal lines, reticulations, subpleural fibrosis, traction bronchiectasis, architectural distortion, and/or honeycombing. The findings were graded as 1. Normal 2. Minimal disease: 3-4 septal lines. 3. Mild: 5 or more septal lines, reticulations, subpleural cysts and GGO. 4. Moderate disease: Grade 2 + traction bronchiectasis, peribronchovascular thickening, or tracheal retraction with one-third to two-thirds lung involvement. 5. Severe: Grade 2 or 3 findings with more than 2/3 s of lung involvement. The severity of the ILD on PFTs was categorized into mild: Reduced total lung capacity, reduced forced vital capacity (FVC), forced expiratory volume in first second (FEV1) <80-60% of predicted FEV1/FVC, moderate: 40-59% and severe <40% in diagnosing the severity of restrictive lung disease due to ILD. The 6 min walk test; <280 m/6 min without supplementation of oxygen is taken as positive. All the patients were followed up to 2 years. The final diagnosis was made on the basis of clinical symptoms, signs, laboratory investigations, and X-ray/HRCT findings. The collected data were analyzed using standard statistical methods.

**OBSERVATIONS AND RESULTS**

The total number of patients attending the Department of Chest Diseases was 34928. Among them 82 patients were included in the study that is confirmed to have been suffering from ILD. The incidence of ILD calculated for the period of 3 years among the patients attending with respiratory symptoms was 0.23. Among them, 56 were male (68.29%) and 26 were female (31.70%) with a male to female ratio of 2.15:1. The patients in the study were divided according to their age into 3 groups. 40/82 (48.78%) belonged to the age group of 42-57 years, 23/82 (28.04%) belonged to above 58 years, and 19/82 (23.17%) belonged to the age group of 26-42 years (Table 1).

Elicitation of the history and examination revealed certain risk factors among the study group. It was observed that
smoking was the most common risk factor among the patients and it was found in 59/82 patients (71.95%), working on farm fields in 27 (32.92%), and connective tissue disorders in 16 (19.51%), (Table 2).

Breathlessness was the most common symptom with which the patients presented in the study group and the symptom was found in 71/82 (86.58%), cough in 65/82 (79.26%), weight loss in 39/82 (47.56%), fever in 35/82 (42.68%), chest pain in (39.02%), and joint pains in 10 (12.19%) patients (Table 3).

Among the laboratory tests performed in the study group, complete CBC was done in all the patients. Abnormal cell counts (lymphocytosis, neutrophilia, polycythemia, and hemoglobin <10 g percentage was taken as abnormal) was observed in 44 patients (53.65%). Erythrocyte sedimentation rate (ESR) was done in all the patients. ESR ≥30 mm/first h were taken as abnormal; 57 patients had high ESR level in this study (69.51%). CRP was done in 71 patients (86.58%) and 32 (45.07%) showed abnormal values with the mean CRP values of 1.84 ± 4.60 mg/dL. Mantoux test was performed in 47/82 patients (57.31%) in those patients who gave a history of TB earlier (20), the test was positive measuring >15 mm/48 h and in 10 patients without a history of TB (21.27%). RF was done in 16 patients and 11/16 (68.75%) patients showed abnormal values with mean values of 102.24 ± 11.25. X-ray chest was done in all the 82 patients, but HRCT was done in only 67 patients. The plain chest X-ray of patients showing bilateral reticular shadows in 54 (65.85%) among the 67 HRCT scans 17 showed bilateral basal interstitial thickening and ground glass appearance which were considered positive for the diagnosis of non-specific interstitial pneumonitis (NSIP) in the study group. 28 among them HRCT showing patchy, predominantly peripheral, subpleural, bibasal reticular abnormalities, and areas of traction bronchiolectasis with limited amount of GGO were considered as IPF (Usual interstitial pneumonitis-UIP). 8 patients showed post-TB cavities. 4 patients showed only minimal reticular pattern. Bronchoalveolar lavage was performed in 29 patients and 26 (89.65%) of them showed non-specific cytology with the total cell count was 2.15 × 10⁵ cells m⁻³. Microbial culture results from the sputum and bronchoalveolar lavage fluid were negative. Transbronchial lung biopsy was done in 3 patients. Histopathology of specimens showed infiltration with inflammatory cells into thickened alveolar septa in 2 patients and in one the alveolitis was characterized as having chronological homogeneity. There was no granuloma formation and eosinophil infiltration. These findings were compatible with the histological pattern of non-specific ILD. The 6-min walk distance was done in 54 patients and 46 patients showed abnormal values with the mean distance was 155.6 ± 12.94 m, with 96% of minimum arterial oxygen saturation measured by pulse oxymetry. PFTs were done in 71 of the total 82 patients and the results were mild restriction in 12 (16.90%), moderate in 36 (50.70%), and severe in 23 (32.39%) of them. A-RNP antibody test was performed in 51 patients and found negative in 16 (31.37%), borderline in 27 (52.94%), and positive in 8 (15.68%). ANA was done in 68 patients and 41 (60.29%) of them had negative ANA-normal; low-level

### Table 1: Age and sex

<table>
<thead>
<tr>
<th>Age</th>
<th>26-41 years - 19 (23.17%)</th>
<th>42-57 years - 40 (48.78%)</th>
<th>&gt;58 years - 23 (28.04%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>13 (88.29%)</td>
<td>32 (48.78%)</td>
<td>11 (28.04%)</td>
</tr>
<tr>
<td>Female</td>
<td>6 (31.70%)</td>
<td>8 (12.19%)</td>
<td>12 (28.04%)</td>
</tr>
</tbody>
</table>

### Table 2: The incidence of risk factors in the study group (n=82)

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>26-41 years - 19 (23.17%)</th>
<th>42-57 years - 40 (48.78%)</th>
<th>&gt;58 years - 23 (28.04%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking - 59 (71.95%)</td>
<td>14</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>Hypersensitivity to drugs- 13</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Farmers - 27</td>
<td>6</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Industrial toxic fumes - 8</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Connective tissue disorders - 16</td>
<td>2</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>H/o tuberculosis - 20</td>
<td>5</td>
<td>8</td>
<td>7</td>
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</tbody>
</table>

### Table 3: The symptomatology in the study group (n=82)

<table>
<thead>
<tr>
<th>Presenting symptom</th>
<th>26-41 years - 19 (23.17%)</th>
<th>42-57 years - 40 (48.78%)</th>
<th>&gt;58 years - 23 (28.04%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathlessness - 71</td>
<td>17</td>
<td>37</td>
<td>17</td>
</tr>
<tr>
<td>Non-productive cough - 65</td>
<td>14</td>
<td>32</td>
<td>19</td>
</tr>
<tr>
<td>Fever - 35</td>
<td>7</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>Chest pain - 32</td>
<td>9</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Joint pain - 10</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Weight loss - 39</td>
<td>10</td>
<td>18</td>
<td>11</td>
</tr>
</tbody>
</table>
positivity ≥1:40 in 25 (36.76%) and ≥1:320 in 2 patients with high ANA titer (2.94%). RF was done in 16 patients with positive results in (68.75%) of the patients. The patients are categorized as autoantibody positive if they had one or more circulating autoantibody levels above the established reference values except ANA and RH factors. The positive results are alone distributed according to the age groups of the patients as shown in Table 4.

Based on the symptoms, clinical features, laboratory tests, and specific and non-specific serological tests of the patients were classified as IPF - 28 (34.14%), desquamative interstitial pneumonia - 14 (17.07%), cryptogenic organizing pneumonia - 08 (09.75%), nonspecific interstitial pneumonia - 17 (32.92%), and RB-ILD - 15 (18.29%) types of ILDs. Most of the differentiation was based on the HRCT pattern. The age group wise distribution is depicted in Table 5.

**DISCUSSION**

ILD basically means progressive scarring of the tissue between the air sacs and a tissue supporting them. It is present in the acute form where the symptoms increase rapidly requiring ventilator support. In chronic patients, the symptoms progress less rapidly as the scarring increases resulting in lung stiffness and hypoxia. ILD is due to known causes such as autoimmune or joint disorders, exposure to organic dust, inorganic fumes, use of medications, and exposure to radiation. Unknown causes include IIPs, such as IPF, NSIP, and sarcoidosis. This study was conducted in a Tertiary Teaching Hospital in North Kerala. Among the 82 patients, male were 56 and female were 26. More than 45% of the patients belonged to the age group of 42-57 years. The demographic data and disease burden in India related to ILD in the literature is scarce. In the present study, more than 45% of the patients belonged to low socioeconomic group and farmers. The ILD diagnosis was made by multidisciplinary discussions and based on the new classification of IIP and the 2011 guidelines for the diagnosis of IPF using HRCT images of the chest as the main platform for diagnostic approach. The demographic profile of Indian patients diagnosed with IPF was similar to the patients with IPF described in the patients of European and Asian descents living in the western and other eastern hemispheres of the world. Gochuico et al.

<table>
<thead>
<tr>
<th>Table 4: Investigations undertaken in the study group and their results (n=82)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigations: Positive result/actual number of test done (%)</td>
</tr>
<tr>
<td>CBC - 44/82 (53.65)</td>
</tr>
<tr>
<td>ESR - 57/82 (69.51)</td>
</tr>
<tr>
<td>CRP - 32/71 (45.07)</td>
</tr>
<tr>
<td>RF - 11/16 (68.75)</td>
</tr>
<tr>
<td>ANA - 27/68 (39.70)</td>
</tr>
<tr>
<td>Anti RNP - 43/51 (84.31)</td>
</tr>
<tr>
<td>- Negative - 16</td>
</tr>
<tr>
<td>- Borderline - 27</td>
</tr>
<tr>
<td>- Positive - 8</td>
</tr>
<tr>
<td>X-ray chest - 54/82 (65.85)</td>
</tr>
<tr>
<td>HRCT - 55/67 (82.08)</td>
</tr>
<tr>
<td>Mantoux test - 30/47 (63.82)</td>
</tr>
<tr>
<td>PFTs - 71/71 (100)</td>
</tr>
<tr>
<td>- Mild - 12 (16.90)</td>
</tr>
<tr>
<td>- Moderate - 36 (50.70)</td>
</tr>
<tr>
<td>- Severe - 23 (32.39)</td>
</tr>
<tr>
<td>6-min walk test - 46/54 (85.18)</td>
</tr>
<tr>
<td>Bronchial lavage cytology - 26/29 (89.65)</td>
</tr>
<tr>
<td>Transbronchial lung biopsy 3/3 (100)</td>
</tr>
</tbody>
</table>

CBC: Complete blood cell count, ESR: Erythrocyte sedimentation rate, CRP: C-reactive protein, A-RNP: Anti-U1-ribonucleoprotein, RF: Rheumatoid factor, ANA: Antinuclear antibodies, HRCT: High-resolution computed tomography, PETs: Pulmonary function tests

<table>
<thead>
<tr>
<th>Table 5: Types of ILD in the study group (n=82)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of ILD (%)</td>
</tr>
<tr>
<td>IPF - 28 (34.14)</td>
</tr>
<tr>
<td>Desquamative interstitial pneumonia - 14 (17.07)</td>
</tr>
<tr>
<td>Cryptogenic organizing pneumonia - 08 (09.75)</td>
</tr>
<tr>
<td>Non-specific interstitial pneumonia - 17 (20.7)</td>
</tr>
<tr>
<td>RB-ILD - 15 (18.29)</td>
</tr>
</tbody>
</table>

ILD: Interstitial lung disease, IPF: Idiopathic pulmonary fibrosis, RB: Respiratory bronchiolitis
found that physical examination and PFT measurements were not sensitive methods of detecting preclinical ILD in patients with rheumatoid arthritis (RA), however, they observed that the history of smoking could be a potential risk factor for its development in the present study smoking was reported in 71.95% of the study group. PFTs showed mild in 16.90%, moderate in 50.70%, and severe in 32.39% of the patients and found to be useful in assessing the severity of the disease. The patients with RA showed positive results on X-ray chest, HRCT, and PFT in 12%, 16%, and 48%, respectively, as reported by Karazincir et al. and they found no correlation between disease activity and HRCT findings in their patients. In the present study, X-ray and HRCT were helpful in the diagnosis of ILD in 65.85% and 82.08%, respectively. In the present study, 16 patients with connective tissue disorders were found to be presenting with symptoms of breathlessness and cough and 10 among them had joint pains; The X-ray and HRCT results among them showed positive features of reticular pattern and ground glass appearance, respectively, in 13/16 (81.25%). Baseline CRP levels are predictive of long-term ILD progression. CRP levels might aid the clinicians in identifying the patients that require more intensive management. CRP levels higher than 3 mg/L had greater hospitalization and death due to chronic obstructive pulmonary disease versus <3 mg/L. The adjustment for the other variables CRP was 1.2 mg/L greater in those who were hospitalized subsequently and died. The CRP measurement predicts the status of pulmonary function volumes including FEV1 or other lung parameters. In the present study, the CRP was done in 71 patients (86.58%) and 32 (45.07%) showed abnormal values with the mean CRP values of 1.84 ± 4.60 mg/dL. Bio-marker levels vary depending on the clinical status whether they are in acute state or chronic state. High bio-marker levels during an exacerbation episode correlate with the short-term prognosis and therefore, their measurement is useful in their management. The patients with ILD associated with autoimmune disease, with ANA titer ≥1:1280 had improved survival, suggesting that an elevated ANA may be a marker for improved prognosis. In the present study, ANA was done in 68 patients and 41 (60.29%) of them had negative ANA values normal; low level positivity ≥1:40 in 25 (36.76%) and ≥1:320 in 2 patients with high ANA titer (2.94%). RF was done in 16 patients with positive results in (68.75%) of the patients. The patients are categorized as autoantibody positive if they had one or more circulating autoantibody levels above the established reference values except ANA and RH factors. Serum antibody A-RNP estimation helps in diagnosing connective tissue disorders which may be associated with ILD. A negative anti RNP antibody result is defined as <20 U based on ELISA. Normal value excludes mixed connective tissue disorders. Sensitivity is 95-100% (if found in high titer s1: 1000000); SLE - 38-44%, DLE - 20-30%, and RA - 10%. The degree of positivity or the titer of antibody does not indicate the severity or duration of the disease. In the present study, the A-RNP titer s were evaluated in 51 patients and found negative in 16 (31.37%), border line in 27 (52.94%), and positive in 8 (15.68%). The available literature shows that the diagnosis of ILD was made on clinical signs and symptoms and validated and enrolled in the ILD-India registry. Among these the hypersensitivity pneumonitis was diagnosed in 47.3% (n = 513; exposure: 48.1% air coolers), attributable to domestic environmental factors; connective tissue disease-associated ILD in 13.9% and IPF in 13.7%. In the present study, the following types of ILD could be diagnosed: IPF - 28 (34.14%), desquamative interstitial pneumonia - 14 (17.07%), cryptogenic organizing pneumonia - 08 (09.75%), nonspecific interstitial pneumonia - 17 (20.7%), and RB-ILD - 15 (18.29%) types of ILDs.

**CONCLUSION**

IPF was the most common ILD in the study followed by non-specific interstitial pneumonia, desquamative interstitial pneumonia, and cryptogenic organizing pneumonia. Multidiscipline investigative approach helps in diagnosis and assessing the prognosis of ILD. The diagnoses vary between investigations undertaken at referral hospitals and by ILD experts. Inclusion of environmental exposure factors conducted in a prospective method would go a long way to provide further insight into the etiology and diagnoses of ILD.

**REFERENCES**

6. Jindal SK, Malik SK, Deodhar SD, Sharma BK. Fibrosing alveolitis: A report of 61 cases seen over the past five years. Indian J Chest Dis Allied

How to cite this article: Kumar MS. Clinical Study on Interstitial Lung Diseases in a Tertiary Teaching Hospital of North Kerala. Int J Sci Stud 2017;5(1):65-70.

Source of Support: Nil, Conflict of Interest: None declared.
Histopathological Profile of Breast Cancer in a Rural Population

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INTRODUCTION

Breast cancer is the most common malignant tumor among females and is one of the leading causes of death worldwide. The incidence of breast cancer is lower in India compared to western countries, the first being carcinoma (CA) cervix. Global burden of breast cancer is 1.7 million according to the WHO latest statistics. India has 17% of global population suffering from breast cancer. Breast cancer is the leading cancer among all districts in Kerala, showing a proportion varying from 22.2% in Kasargod and 29.2% in Thiruvananthapuram. Mammography and self-examination lead to early detection and thus reduced the mortality of breast cancer in western countries.

However, late presentation, lack of awareness, and sociodemographic status increase the mortality in developing countries. Although the majority of underlying causes and other features are usually uniform worldwide, every region has its own uniqueness for that cancer. In Indian scenario, there is a rising incidence with age shift toward younger women, aggressive tumors, and late presentation. Within India, there are substantial differences in the incidence rates of breast cancer in rural and urban areas.

Objective

The objective of this study was to describe the frequency and prognostic factors related to the extent and biology of the breast cancer in a rural scenario for 13 years.

MATERIALS AND METHODS

A record-based retrospective study was undertaken and analyzed of all breast cancer cases received in Pathology Department during 2002 to 2015 at Dr. SMCSI Medical College, Karakonam.

Results:

A total of 256 breast cancer cases were received in the Pathology Department. Majority of patients was in postmenopausal age with left sided as common presentation. Pathological staging T², Grade 2 and Nottingham prognostic index – good prognosis accounts for majority of the cases in our study.

Conclusion:

Despite the fact, breast cancer is the most common cancer among females. The disease shows a significant geographic and ethnic variation in age distribution.

Key words: Breast, Cancer, Population
College, Karakonam. Grading and staging were done according to the Nottingham modification of the Bloom and Richardson Grading System and TNM staging system, respectively. Cases were scored according to the Nottingham prognostic index (NPI). Data obtained were analyzed using SPSS version 16 and value presented descriptively.

**RESULTS**

During these 13 years, a total of 256 breast cancer cases were received in the pathology department. Of these, 186 cases were of mastectomy and 70 cases were of lumpectomy. Most common presentation was lump. Others include breast pain, nipple discharge, and skin changes.

Majority of patients ranged between the age group 51 and 60 years. Maximum age was 83 and minimum 22 at the time of presentation. 66.9% of patients was of postmenopausal age considering 45 as menopausal age. Most common side of presentation was left side with 53.5%.

Out of 256 breast cancer patients, 222 cases were of infiltrating ductal CA of number special type. Ductal CA in situ accounts for 13 cases. Size of tumor varied between 16 and 0.2 cm. Average size of tumor was 4 cm.

T2 accounts majority of our cases that is about 54.7%. Of the lymph node (LN) available in 186 cases, 106 cases showed LN metastasis.

Grading was done to all the 245 cases with invasive breast cancer. Grade 2 was common among our study group (72.7%).

NPI prognostic index was applied to all 245 invasive breast cancer cases and 55.5% (136 cases) showed good prognosis.

We tried to analyze the correlation between menopausal status and grade, LN. Furthermore, among pathological stage, LN involved and grade of tumor.

No statistically significant association found between menopausal status and grade, LN.

Statistically significant association was found between pathological staging and LN also the grade but not between LN and grade (Tables 1-4 and Figures 1-7).

**DISCUSSION**

Despite the fact, breast cancer is the most common cancer among females. The disease shows significant geographic and ethnic variation in age distribution. Our study shows that the majority of patients was between 51 and 60 years (30.9%). Furthermore, menopause also plays an important role in the distribution of cancer. In our study, 66.9% comprises postmenopausal females. Most common side of presentation is left side. This is similar to studies by Ahmed A. Zeeneldin et al. and R.T. Senie et al. with a suggestion that breast size and volume is attributing to this laterality in breast cancer.1,2 Most common histological variant in our study was invasive ductal CA of number special type which is similar to Forae et al., Godwin A. Ebughe, and Saxena et al.3-5 Various studies showed the importance
and decreased survival as size of tumor increases. Thus, TNM staging plays an important role in the staging, treatment, and outcome of patients. Our study shows majority fall into T2 (54.7%). This is similar to the study by Ahmad et al.6 Of the total invasive breast cancer, 106 cases LN metastasis (excluding unavailable data, CA in situ and not present) out of 186 cases recovered. NPI was applied to 245 invasive cancer cases and majority of cases were of good prognosis (136 cases).

REFERENCES

Clinicopathological Study of Cervical Node Enlargement: A Prospective Study

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Abstract

Introduction: Head and neck region is rich in lymphatics. Cervical lymphadenopathy is relatively common clinical observation. Cervical lymphadenopathy is a diagnostic dilemma to the surgeon. The various avenues available for the analysis of cervical node enlargement are clinical evaluation, aspiration cytology, and open biopsy.

Aim: The study indents to find out systematically the various pathological conditions presenting with nodes.

Methods: Detailed history will be taken followed by physical examination in all the patient with cervical lymphadenopathy. After making a clinical diagnosis, further relevant investigations were carried out to confirm the diagnosis.

Results: Majority of the cases in this study had non-neoplastic causes for cervical lymphadenopathy in which tuberculosis is most common. Male to female ratio of 1.3:1. Maximum incidence was found to be tuberculosis. Maximum number of cases were in the age group of 21-30 years. The constitutional symptoms were fever, pain, cough, sinus, and loss of appetite. All cases presented with swelling neck. Fever was the most commonly presenting symptom.

Conclusion: The most common cause of cervical lymphadenopathy is tuberculosis, reactive lymphadenitis and metastatic secondaries. Fine-needle aspiration cytology is a cheap, quick, readily available, and dependable diagnostic modality and can be used as a first line investigatory tool in outdoor departments.

Key words: Cervical lymphadenopathy, Fine-needle aspiration cytology, Histopathological examination

INTRODUCTION

Lymph nodes are peripheral lymphoid organs. There are approximately 800 lymph nodes in the body. No fewer than 300 of them lie in the neck which is involved in the various pathological conditions. Lymphadenopathy is one of the most common clinical manifestations of many diseases.¹ It is defined as an abnormality in the size and character of the lymph nodes caused by the invasion or propagation of either inflammatory cells or neoplastic cells into the lymph node. Head and neck region is rich in lymphatics.² Cervical lymphadenopathy is relatively common clinical observation. Cervical lymphadenopathy is a diagnostic dilemma to the surgeon. The analysis of lymph node enlargement is not an easy task and the diagnosis is difficult because most of the disease resemble each other. The various avenues available for the analysis of cervical node enlargement are clinical evaluation, aspiration cytology, and open biopsy. Each method of diagnosis has its own merits and demerits.³ Traditionally, open biopsy and its histopathological study are the main-stay for diagnosis of cervical lymphadenopathy.⁴

Aims

To study the prevalence of the cervical lymphadenopathy with respect to age and sex, various clinical presentations, and to correlate the pathological findings with the clinical manifestations.
MATERIALS AND METHODS

This prospective study was conducted in the Department of General Surgery, Tirunelveli Medical College. Informed consent and Institutional Ethics Committee approval was obtained. Any patient with age group above 12 years and both genders presenting to general surgery outpatient department with neck swelling. Data were collected by detailed history followed by physical examination, chest X-ray, biopsy in all the patient with cervical lymphadenopathy. After making a clinical diagnosis, further relevant investigations were done to confirm the diagnosis.

RESULTS

In the present study of 50 cases, the maximum number of the case was in the age group 21-30 years. Male to female ratio was 1.3:1. (Table 1). Neck swelling and fever were most commonly presenting symptoms (Table 2). The maximum incidence was found to be tuberculosis which was 24 (48%) cases, next was reactive lymphadenitis (28%) followed by secondaries (16%) and lymphomas (8%) (Table 3). It was observed that upper jugular group was commonly involved in tuberculosis, the submandibular and submental group of lymph node mostly affected in reactive lymphadenitis (Table 4). Discrete enlargement than matted lymph nodes was noted in tuberculosis (Table 5). Out of 24 cases of tubercular lymphadenopathy, only 2 cases showed positive chest X-ray finding of pulmonary tuberculosis (Table 6).

DISCUSSION

Lymphatic system development begins at the 5th week of gestation. During the 5th week of gestation 2 paired and 2 unpaired endothelial sacs arises, these sacs which form the Primordia of the lymphatic system. The body contains approximately 800 lymph nodes out of these 300 lymph nodes are located in the neck. For discussion, purpose neck is divided, into triangles. Use of the triangle is simply an organizational device that parcels the volume of anatomic detail in the neck into study units. There are seven levels of lymph nodes present in the neck. Main cause of lymph node enlargement in the neck are inflammatory mainly tuberculosis, Neoplastic (lymphomas), secondaries from head and neck cancers, non-specific lymphadenitis. Spreading antegrade infection and chronic recurrence was found to be the characteristics of the mixed type of cervical lymph node tuberculosis. The natural clinical stages of tuberculous cervical lymphadenitis are Stage 1 (The node enlargement without matting), Stage 2 (enlarged lymph node with matting, most characteristic feature of tuberculous lymphadenitis), Stage 3 (caseation and liquefaction), Stage 4 (Cold abscess) Stage 5 (sinus). The constitutional symptoms were fever, pain cough, sinus, and loss of appetite.
CONCLUSION

Most common cause of cervical lymphadenopathy is tuberculosis, reactive lymphadenitis and metastatic secondaries. Fine-needle aspiration cytology is a cheap, quick, readily available and dependable diagnostic modality and can be used as a first line investigatory tool in outdoor departments.

Table 5: Presentation of lymph nodes

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Number of cases</th>
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<tr>
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<tr>
<td>Discrete</td>
<td>16</td>
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<tr>
<td>Total</td>
<td>24</td>
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</tbody>
</table>

Table 6: Chest X-ray positivity in tubercular lymphadenitis

<table>
<thead>
<tr>
<th>Chest X-ray</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>2</td>
</tr>
<tr>
<td>Negative</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

REFERENCES


Source of Support: Nil. Conflict of Interest: None declared.
A Single-center Clinicopathological Study of Carcinoma Breast

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Abstract

Introduction: Both disease and surgery of the breast evoke a fear of mutilation and loss of femininity. Cosmetic considerations, false vanity, and fear of infertility have hindered early diagnosis and prompt treatment of breast cancer from earliest recorded history to until today.

Materials and Methods: This study is a prospective study of carcinoma breast done at Sri Ramachandra Medical College and Research Institute from June 2014 to August 2016. It comprises 122 cases of cancer breast which presented at the outpatient department.

Results: According to our study, it is quite evident that the peak incidence of carcinoma breast in our semiurban population is in the fifth and sixth decade. Most of our patients were postmenopausal and had a body mass index >35 and had two or more children. The majority of our cases (42.6%) preoperatively were staged as IIA, which was reflected in the postoperative staging as well (Stage IIA - 39.3%). It was also found that Stage IIIC differed vastly in the postoperative staging (16.4%) as compared to its preoperative status (1.6%).

Conclusion: There is a vast difference (50.77%) between the pre- and post-operative staging of the nodes in carcinoma breast. The pathological nodal staging is marginally higher compared to clinical staging in premenopausal women than in postmenopausal women.

Key words: Risk factors for Ca breast, Nodal staging, Clinicopathological study

INTRODUCTION

Both disease and surgery of the breast evoke a fear of mutilation and loss of femininity. Cosmetic considerations, false vanity and fear of infertility have hindered early diagnosis and prompt treatment of breast cancer from earliest recorded history to until today.

Breast cancer is the most common site-specific malignancy in women and is the most common cause of cancer-related death in women aged 20-59 years. 26% of all newly diagnosed cancers in females are breast cancer. Breast cancer accounts for 15% of all cancer-related deaths in women.¹

While about 900,000 women are diagnosed each year, 519,000 deaths/year worldwide are due to this dreaded disease. Mortality from breast cancer is 4.32/100,000 in women and 1.20/100,000 in males. Mortality rates from breast cancer have increased during the past 60 years in every country.²

The incidence of breast cancer in India is increasing. It is reported that almost one in 22 women in India is likely to suffer from breast cancer during their lifetime.³

It is most often observed anecdotally that due to lack of knowledge and ignorance, patients of carcinoma breast clinically present in a late stage of the disease.

Breast cancer has been classically described as disease of the old age with the peak incidence in the fifth and sixth decades; however, in our country, this disease is commonly diagnosed a decade earlier.⁴

The idea of this study is to do an analysis of the clinical and pathological aspects of cancer breast in a semiurban
population and to compare it with previous studies if any.

**Objectives**
- To study presentation, age distribution, incidence of predisposing factors
- To do a clinical and pathological analysis of patients with carcinoma breast in a semiurban population
- To compare and contrast the clinical and pathological staging of carcinoma breast with a special emphasis on analysis of the nodal status both clinically and pathologically.

**MATERIALS AND METHODS**

This study is a prospective study of carcinoma breast done at Sri Ramachandra Medical College and Research Institute from June 2014 to August 2016.

It comprises 122 cases of cancer breast which presented at the outpatient department.

The exclusion criteria followed in this study were:
- Cases which were operated elsewhere
- Cases in which neoadjuvant chemotherapy was already given.

All the cases underwent a thorough clinical examination, following which a routine blood examination and mammography were done. A preoperative chest X-ray was also done. For a few cases in which there were indications to do so, computed tomography scan of the thorax was done. Ultrasonography abdomen was done as a routine to rule out abdominal metastases as was a whole-body skeletal scan to rule out bony metastases. All patients underwent modified radical mastectomy.

The population of the study ranged from the lower socioeconomic class to the middle class.

**RESULTS**

In our study, the following observations were noted, certain of which have been compared to previous studies which have been done.

According to our study, it is quite evident that the peak incidence of carcinoma breast in our semiurban population is in the fifth and sixth decade (Table 1). Most of our patients were postmenopausal and had a body mass index (BMI) >35 and had two or more children (Tables 2-4).

The majority of our cases (42.6%) preoperatively were staged as IIA, which was reflected in the postoperative staging as well (Stage IIA - 39.3%). It was also found that Stage IIIIC differed vastly in the postoperative staging (16.4%) as compared to its pre-operative status (1.6%) (Tables 5 and 6).

Table 7 reveals the change in the nodal status between clinical and pathological states. About half of the cases did
not show any variance in the nodal status, while around one-third of the cases were found to be of a higher grade pathologically compared to their clinical state.

The most common histological type of malignancy was infiltrating ductal carcinoma (84.4%) (Table 8). Tables 9 and 10 reiterate the fact that the larger the tumor, there is a greater chance of having a nodal metastasis both clinically and pathologically.

As per the pro forma followed for this study, established risk factors were taken into account and noted. These findings are noted in Table 11.

Table 12 establishes the fact that in postmenopausal women, the chances of upstaging of involved lymph nodes is marginally lower than in premenopausal women while Table 13 shows that in both obese and normal weight women, the chances of erroneous nodal staging are high (50.8%).

**DISCUSSION**

The risk factors for the development of carcinoma breast are well known but not for a subset of the Indian population. In our study, it was noticed that 3.2% of the patients had at least one first-degree relative with a previous history of breast cancer, ovarian cancer, or cancer colon, comparatively lower than the west which is around 13.3-21.1%. Concerning alcohol, it is found in literature that 4-10% of women having carcinoma breast were consumers of alcohol, while in our study, it was as

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### Table 7: Nodal status variance between clinical and pathological states

<table>
<thead>
<tr>
<th>Nodal status change</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0 to pN1</td>
<td>6 (4.91)</td>
</tr>
<tr>
<td>N0 to pN2</td>
<td>2 (1.63)</td>
</tr>
<tr>
<td>N0 to pN3</td>
<td>2 (1.63)</td>
</tr>
<tr>
<td>N1 to pN2</td>
<td>14 (11.47)</td>
</tr>
<tr>
<td>N1 to pN3</td>
<td>12 (9.83)</td>
</tr>
<tr>
<td>N2 to pN3</td>
<td>6 (4.91)</td>
</tr>
<tr>
<td>Regression of nodes</td>
<td>20 (16.39)</td>
</tr>
<tr>
<td>Same status/no nodal change</td>
<td>60 (49.18)</td>
</tr>
<tr>
<td>Upgrading of nodal status</td>
<td>42 (34.38)</td>
</tr>
</tbody>
</table>

### Table 8: Histological types of malignancy

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of cases (122)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCIS</td>
<td>2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>LCIS</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Invasive ductal carcinoma</td>
<td>103 (84.4)</td>
<td></td>
</tr>
<tr>
<td>Invasive lobular carcinoma</td>
<td>8 (6)</td>
<td></td>
</tr>
<tr>
<td>Medullary carcinoma</td>
<td>2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Miscunic carcinoma</td>
<td>2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Tubular carcinoma</td>
<td>1 (0.8)</td>
<td></td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>2 (1.6)</td>
<td></td>
</tr>
<tr>
<td>Metaplastic breast carcinoma</td>
<td>1 (0.8)</td>
<td></td>
</tr>
<tr>
<td>Paget’s disease</td>
<td>1 (0.8)</td>
<td></td>
</tr>
<tr>
<td>Inflammatory breast carcinoma</td>
<td>0 (0)</td>
<td></td>
</tr>
</tbody>
</table>

DCIS: Ductal carcinoma in situ, LCIS: Lobular carcinoma in situ

### Table 9: Relationship between pathological tumour size and clinical node positivity

<table>
<thead>
<tr>
<th>Pathological Tumor size</th>
<th>N0</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
<th>N1+N2+N3</th>
<th>N1+N2+N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>pT1 (8)</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>pT2 (82)</td>
<td>46</td>
<td>12</td>
<td>8</td>
<td>16</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>pT3 (24)</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>pT4 (8)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>64</td>
<td>22</td>
<td>16</td>
<td>20</td>
<td>58</td>
<td>58</td>
</tr>
</tbody>
</table>

### Table 10: Relationship between pathological tumour size to node positivity

<table>
<thead>
<tr>
<th>Tumor size</th>
<th>Positive for malignancy</th>
<th>Negative for malignancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>pT1 (8)</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>pT2 (82)</td>
<td>36</td>
<td>46</td>
</tr>
<tr>
<td>pT3 (24)</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>pT4 (8)</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>64</td>
</tr>
</tbody>
</table>

### Table 11: Relationship of carcinoma breast to prior existing risk factors

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familial history</td>
<td>4/122 (3.2)</td>
</tr>
<tr>
<td>Previous breast cancer</td>
<td>0/122 (0)</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>1/122 (0.8)</td>
</tr>
<tr>
<td>Obesity (BMI&gt;30)</td>
<td>78/122 (63.9)</td>
</tr>
<tr>
<td>OCP usage</td>
<td>18/122 (14.5)</td>
</tr>
<tr>
<td>Nulliparous</td>
<td>15/122 (18.3)</td>
</tr>
<tr>
<td>Breastfeeding not done</td>
<td>10/122 (8)</td>
</tr>
<tr>
<td>Early menarche (age&lt;12)</td>
<td>14/122 (11)</td>
</tr>
<tr>
<td>Late menopause (age&gt;50)</td>
<td>18/122 (14.5)</td>
</tr>
</tbody>
</table>

OCP: Oral contraceptive pills, BMI: Body mass index

### Table 12: Nodal status variance between clinical and pathological states in pre-and post-menopausal groups

<table>
<thead>
<tr>
<th>Nodal status change</th>
<th>Pre-menopausal (30)</th>
<th>Post-menopausal (92)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0 to pN1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>N0 to pN2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>N0 to pN3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>N1 to pN2</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>N1 to pN3</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>N2 to pN3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Upgrading of nodes</td>
<td>42</td>
<td>12 (40%)</td>
</tr>
<tr>
<td>Downgrading of nodes</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>
| Same status/no nodal change   | 60                  | 32                   | 28
low as 0.8%. Renehan analyzed 31 studies and discovered a 12% increase in the risk of developing breast cancer for each 5-point increase in BMI.6 63.9% of our patients had a BMI >30. Greater numbers are required to stratify the risk involved with different BMIs. 18.3% of our patients were nulliparous and only 8% had not breastfed. A minority of our cases had early menarche (11%) and late menopause (14.5%), which is consistent with many studies.7

It is well known that clinical appraisal of axillary nodes is notoriously inaccurate; hence, there is a need for an accurate staging with special relevance to axillary nodes.

According to Cutler and Connelly in 1969, clinically negative nodes become pathologically positive in 37%.8

Paik et al. in the NSABP trial of 19769 revealed his findings that
• Positivity of nodes turning negative was as high as 24%
• Negativity of nodes turning positive was as high as 39%.

In our study:
• Clinically positive nodes turning pathologically negative was 16.39%
• Clinically negative nodes turning pathologically positive was 34.38%.

Ross et al. in 1990 revealed that in their study, 17% of T1N0 lesions ended up having positive nodes, while in T2NO lesions, the nodal status pathologically was 27%.10

The NSABP trial 06 also revealed that there was a 40% error rate in diagnosing axillary nodes.9

In our study, the most common surgical procedure was modified radical mastectomy with axillary clearance.

The reasons for choosing the above procedure were:
• Breast conservation and less radical procedures were not tried because of less follow-up and lack of radiotherapeutic facilities at present in our hospital setup.

Guy’s hospital in London did a randomized controlled trial between conservative breast surgery and modified radical mastectomy showed there was increased local recurrence following conservative surgery in Stage I disease and the results were worse in Stage II disease and even with radiotherapy, there was decreased local control and decreased survival.11

However, the NSABP-06 (8 years) trial showed that there was no difference in local recurrence and survival between conservative and modified radical mastectomy. However, without radiotherapy, there was an increased recurrence.

An Asian study done by Zhang et al.,12 conservative breast surgery along with the radiotherapy and chemotherapy shows good results in early breast cancer but depend on strict adherence to indication of treatment, meticulous surgery, and radiotherapy, the disease-free survival rate was 96% for 5 years.

Savithri et al. in 198913 showed disease-free survival of 96%, with no local recurrence in 144 patients 5 years after conservation.

Clinical assessment of axillary lymph nodes is inaccurate and observer dependent. Error rates are accepted in all studies.

Axillary clearance is done to achieve basic tenets of surgical oncology and achieve the stated goals. It has been a routine procedure in our management.

Long-term disease-free survival is increased with axillary dissection.

NSABP-0414 studies state that survival rates is the same, but inordinately high systemic failure rate with axillary recurrences, would suggest that more aggressive local control could many of the failures.

The value of axillary dissection is mainly to provide exact prognostic information for staging and plan for adjuvant treatment.

Snider et al.15 quote sentinel node biopsy for ruling out axillary clearance, and that is, 100% accurate and 88% specific. Positron emission tomography/lymphoscintigraphy can identify patients with clear axillary areas, but it is still not recommended.16

This study did not involve the usage of sentinel node biopsy as it did not fall under its purview and might not

| Table 13: Nodal status variance between clinical and pathological states with relation to obesity |
|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Nodal status change         | N  | Obese (78) | Overweight (31) | Normal (13) |
| N0 to pN1                   | 6  | 3          | 2              | 1           |
| N0 to pN2                   | 2  | 1          | 1              | 0           |
| N0 to pN3                   | 2  | 2          | 0              | 0           |
| N1 to pN2                   | 14 | 8          | 3              | 3           |
| N1 to pN3                   | 12 | 8          | 2              | 2           |
| N2 to pN3                   | 6  | 4          | 1              | 1           |
| Upgrading of nodes          | 42 | 26         | 9              | 7           |
| Downgrading of nodes        | 20 | 16         | 2              | 2           |
| Same status/no nodal change | 60 | 36         | 20             | 4           |
help in correlating the comparison between clinical and pathological node staging.

CONCLUSION

• There is a vast difference (50.77%) between the pre- and post-operative staging of the nodes in cancer breast
• The pathological nodal staging is marginally higher compared to clinical staging in premenopausal women than in postmenopausal women
• The pathological nodal staging is marginally higher compared to clinical staging in obese and overweight women than in women with a normal BMI
• Considering the above findings, axillary clearance may be a better option in the management of carcinoma breast rather than offering breast conservation techniques irrespective of stage although it needs further studies to see efficacy of sentinel node biopsy
• Considering the above findings, high-frequency ultrasonogram of the axilla may be beneficial in nodal staging clinically
• Further studies will involve the addition of sentinel node biopsy and high-frequency ultrasonogram to further compare the differences between clinical and pathological staging.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Clinicopathological Study on Multinodular Goiter: A Prospective Study

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1Associate Professor, Department of General Surgery, Sivagangai Medical College Hospital, Sivaganga, Tamil Nadu, India, 2Junior Resident, Department of General Surgery, Sivagangai Medical College Hospital, Sivaganga, Tamil Nadu, India, 3Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Multinodular goiter (MNG) describes an enlarged, diffusely heterogeneous thyroid gland. Initial presentation may include diffuse enlargement, but the mass often develops asymmetrical nodularity. The cause of this mass is usually iodine deficiency.

Aim: To study the clinicopathological features of MNG and its management and its various post-operative complications.

Materials and Methods: The patients diagnosed as a case of MNG will undergo detailed history taking, clinical examination, and investigations. After surgery, the patients will be followed up for any immediate post-operative complications.

Results: Hyperthyroidism in MNG was present in 14% cases as a part of natural evolution of the disease. Post-operative complications occurred in three cases (two received laryngeal nerve injury and one hypoparathyroidism). Histopathological examination revealed colloid goiter in 74% of cases.

Conclusion: In our study, MNG was commonly observed in females. MNG is commonly observed in the fourth decade of life. In most of the cases, one can diagnose a number of nodules clinically. Visualization of the recurrent laryngeal nerve during surgery is an important factor for low incidence of nerve injuries in our study group.

Key words: Complications, Histopathology, Multinodular goiter, Thyroid gland

INTRODUCTION

Thyroid gland is an endocrine gland situated in the anterior side of the neck. Its main function is regulation of the basal metabolic rate, stimulates somatic and psychic growth, and plays an important role in calcium metabolism. Multinodular goiter (MNG) is defined as the palpation of multiple distinct nodules in the enlarged thyroid gland. The etiopathogenesis of MNG is not very clear. A mild dietary deficiency of iodine, slight impairment of hormone synthesis, increased iodide clearance from the kidneys, and the presence of thyroid-stimulating immunoglobulins have been suggested as the various causes.1 Initially, the mass is euthyroid; however, with increasing size, elevations in T3 and T4 can occur and progress gradually into clinical hyperthyroidism. Workup and diagnosis include evaluation of thyroid function tests. Ultrasound and radioisotopic scanning demonstrate heterogeneous thyroid substance. Nodules with poor uptake can present as lesions suspicious for malignancy. Thyroid nodules have been reported to be found in 4-7% of the population on palpation and in 30-50% of the population by ultrasonography (USG).2,4 It has been observed that 50.5% of the solitary nodules which are felt on palpation are actually a part of the MNG. The incidence of carcinoma in MNG has been reported as 5-10%. Therefore, fine-needle aspiration cytology (FNAC) for diagnosis and resection for suspicious lesions should be considered. Hyperthyroidism may be adequately controlled by drugs, but surgical management is the preferred treatment. Subtotal or total thyroidectomy may perform depending on the involvement of the thyroid gland. Radioactive iodine therapy is reserved for elderly individuals who represent a poor operative risk. The complications of thyroid surgeries are hemorrhage, respiratory obstruction,
vocal cord paralysis, hypoparathyroidism, thyroid insufficiency, thyrotoxic storm, and wound infection. With this background, the present study was planned to study of clinical profile of MNG.

**Aim**

To study the clinicopathological features of MNG and its management and its various post-operative complications.

**MATERIALS AND METHODS**

This is a prospective clinical study was conducted in the department of surgery, Sivagangai Medical College Hospital. The patients diagnosed as a case of MNG will undergo detailed history taking, clinical examination, investigations such as complete blood count, thyroid profile, FNAC, X-ray chest and neck, and USG of neck. After surgery, the patients will be followed up for any immediate post-operative complications. The specimen will be sent for histopathological examination (HPE), and the results will be recorded. Inclusion criteria were all cases admitted in the department of surgery diagnosed as a case of MNG, above the age of 20 years, and cases presenting with both toxic and nontoxic features. Exclusion criteria were pregnant women, cases presenting with solitary nodule, and cases with diffuse enlargement of thyroid gland.

**RESULTS**

In our study, among the fifty cases, majority of cases were in the 30-40 years of age group and 94% of the cases were females (Table 1).

The presenting complaint was a swelling in the anterior aspect of neck in all the cases studied, which was associated with pain in 48% of the cases (Table 2).

The FNAC reports of the 50 cases showed nodular colloid goiter as the most common finding followed by Hashimoto’s thyroiditis (Table 3). The HPE reports of 74% of the cases were colloid nodular goiter and 18% had features suggestive of Hashimoto’s thyroiditis (Table 4).

The average post-operative stay among the 50 cases studied was 5.3 days and 76% of the cases were discharged between 4th and 6th post-operative days (Table 5). Post-operative complications occurred in three cases, two cases with recurrent laryngeal nerve injury, and case with hypoparathyroidism.

**DISCUSSION**

In this study, 50 patients diagnosed as MNG without any evidence of malignancy were evaluated in terms of history taking and clinical examination. Relevant investigations were performed, and surgery was performed after FNAC. The HPE of the specimen was done. The results were collected, compiled, and analyzed. In our study, 94% of cases were females comparable to the results of Zambudio et al. which showed 89% incidence in females. Majority of cases were in the 30-40 age group, followed by the age group of 30-40 years. This is compared to the analysis of 1280 cases by Bremer and Night, which showed maximum incidence between 40 and 50 years, shows a lesser age group commonly involved in our population. The mean age of incidence was 42.26 years of age. The presenting complaint was a swelling in all cases (100%). The swelling was associated with pain in 48% of cases. Pressure symptoms were present in 44% of cases which is comparable to the study by Ríos et al. who had a result of 28.5% of cases presenting with pressure symptoms. The FNAC reports showed that nodular colloid goiter (64%) is the most common finding followed by Hashimoto’s thyroiditis. The report was follicular neoplasm for two cases, so total thyroidectomy was performed in those cases to rule out malignancy. All the cases were taken up for surgery, 88% cases underwent total thyroidectomy, and 10% cases underwent subtotal thyroidectomy. One case with multinodularity of one lobe of the thyroid - largest measuring 0.7 cm underwent right lobectomy, who was followed up for 3 months and the opposite lobe was found to be normal. Post-operative complications occurred in three cases (6%). Two cases developed recurrent laryngeal nerve injury of whom one patient developed stridor and tracheostomy was performed. The other patient recovered following management with elective ventilation and steroid therapy. Although identification has been associated with a lower rate of complications and is crucial during extracapsular resection or resection of the posterior nodules, there are authors such as Wheeler who do not consider it necessary since manipulation can lesion them. Both recurrent nerves were routinely identified in our series. One patient developed hypoparathyroidism. The average post-operative hospital stay was 5.3 days. 76% of cases were discharged between 4th and 6th post-operative days. The HPE of the resected specimen showed that 37% of the cases were colloid nodular goiter and 18% of cases had features of Hashimoto’s thyroiditis. There was one case of follicular carcinoma (Hurthle cell variant) and one case of papillary carcinoma whose FNAC report was inconclusive. Incidence of malignancy in MNG was 4% which is comparable to the studies by Gandolfi et al.

**CONCLUSION**

FNAC is a very useful investigation except in differentiation of follicular neoplasms. Carcinoma is not uncommon...
in cases of MNG. Hence, suspicion should always be present. Visualization of the recurrent laryngeal nerve during surgery is an important factor contributing to the low incidence of nerve injuries in our study group. Post-operative stay should be reduced and day case surgery should be promoted.

**Table 1: Age distribution of MNG**

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>10 (20)</td>
</tr>
<tr>
<td>30-40</td>
<td>16 (32)</td>
</tr>
<tr>
<td>40-50</td>
<td>11 (22)</td>
</tr>
<tr>
<td>50-60</td>
<td>08 (16)</td>
</tr>
<tr>
<td>Above 60</td>
<td>05 (10)</td>
</tr>
</tbody>
</table>

MNG: Multinodular goiter

**Table 2: Incidence of various presenting complaints**

<table>
<thead>
<tr>
<th>Presenting complaints</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>50 (100)</td>
</tr>
<tr>
<td>Pain</td>
<td>24 (48)</td>
</tr>
<tr>
<td>Heat/cold intolerance</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Increased/decreased appetite</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Tremors</td>
<td>08 (16)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>5 (10)</td>
</tr>
<tr>
<td>Palpitation</td>
<td>16 (32)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>22 (44)</td>
</tr>
<tr>
<td>Hoarseness of voice</td>
<td>10 (20)</td>
</tr>
</tbody>
</table>

**Table 3: FNAC in MNG**

<table>
<thead>
<tr>
<th>FNAC report</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colloid nodular goiter</td>
<td>32 (64)</td>
</tr>
<tr>
<td>Hashimoto’s thyroiditis</td>
<td>11 (22)</td>
</tr>
<tr>
<td>Adenomatous goiter</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Follicular neoplasm</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Inconclusive</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

FNAC: Fine-needle aspiration cytology, MNG: Multinodular goiter

**Table 4: HPE report in the operated cases**

<table>
<thead>
<tr>
<th>HPE report</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colloid nodular goiter</td>
<td>37 (74)</td>
</tr>
<tr>
<td>Hashimoto’s thyroiditis</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Follicular adenoma</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Follicular carcinoma</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

HPE: Histopathological examination

**Table 5: Post-operative stay following thyroid surgeries**

<table>
<thead>
<tr>
<th>Number of days</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>04 (8)</td>
</tr>
<tr>
<td>4-6</td>
<td>38 (76)</td>
</tr>
<tr>
<td>7-9</td>
<td>05 (10)</td>
</tr>
<tr>
<td>More than 9</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.
Single-incision Multiport Laparoscopic Appendectomy versus Conventional Laparoscopic Appendectomy: A Single-center Randomized Control Study

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Abstract

Background: Acute appendicitis is the most common surgical emergency and early surgical intervention improves outcome. Laparoscopic Appendectomy has become the mainstay of surgical management of appendicitis. Single incision surgery, a recent offshoot of Laparoscopy is slowly going momentum.

Objective: This study aims to compare the standard conventional Laparoscopic Appendectomy with Single Incision Laparoscopy as regards pain, operating time, wound infection, scar satisfaction, postoperative hospital stay and time to return to work.

Materials and Methods: A randomised control study was done by alternation with sample size of 100 which divided into two groups(study group 50 and control group 50). After obtaining consent, the patients are taken up for conventional laparoscopic or Single incision laparoscopic surgery surgery according to the randomization. Post operatively, the following parameter are monitored: Post operative pain, Duration of the procedure, Surgical site infection and Patient satisfaction regarding scar

Results: In our study, there was no difference in the duration of surgery between the two groups. Pain scoring was higher in the conventional laparoscopy group at 6 and 12 hours after surgery. There was no significant difference in the infection rates between the two groups. Patient satisfaction regarding the scar was higher in the single incision group. There was no significant difference in the duration of hospital stay and time taken to return to work.

Conclusion: With these above findings our conclusion is that the Single Incision Multiport Laparoscopic Appendectomy has as many benefits as Conventional Laparoscopic Appendectomy and can be treated as a safe and viable option for a patient with Appendicitis

Key words: Acute appendicitis, Laparoscopic appendectomy, Single incision multiport laparoscopic appendectomy

INTRODUCTION

Recent advances in laparoscopic instrumentations have made it possible to perform intra-abdominal surgery through a small incision that can be hidden within the umbilicus, which provides better cosmetic results, decreased stay in hospital, and better satisfaction to the patients.

Single-incision laparoscopic surgery (SILS) is a variant of minimally invasive surgery, involving access to the abdomen through a specialized port or by an incision which appears single externally but fascially has multiple punctures, as compared to the traditional four to five small incisions. All surgical instruments are placed through this small incision usually located in the umbilicus. In general, single-incision laparoscopy takes about the same amount of time as traditional laparoscopic surgeries. However, it is recognized as more complicated because it involves manipulating three articulating instruments through one access port.¹ ²

Obesity, severe adhesions, or scarring from previous surgeries are a few of the factors that would prohibit patients from

getting the surgery. Single-incision surgery has been given a panoply of acronyms and names, including SILS, single-port access surgery, laparoscopic, endoscopic single-site surgery, single-laparoscopic incision transabdominal surgery, one-port umbilical surgery, natural orifice transumbilical surgery, and embryonic natural orifice transumbilical endoscopic surgery.

The necessary close proximity of the trocars in a fixed position is among the disadvantages of this technique. The movement of the hands is restricted, causing clashing between instruments, and the fixed entry in the umbilicus creates an extended distance toward the surgical site. This is contradictory toward the traditional triangulation of instruments in laparoscopy, creating a steep learning curve. Thus, the lack of triangulation, pneumoperitoneum leaks, and instrument clashing are disadvantages of the procedure. Furthermore, there is not any long-term data that show morbidity of SILS. Multiple, closely placed fascial punctures may lead to hernia, and wide skin flaps may lead to seroma formation. Still many surgical treatments have been performed safely using these techniques, and variations have been described. As new instruments are developed to accommodate the new paradigm of SILS, chances are that technical difficulties are going to be minimized. Prospective comparisons of the single-incision and conventional laparoscopy are lacking. The purpose of this study is to ascertain if single-incision laparoscopy is as feasible as conventional laparoscopy.1,5,7

Aims and Objectives
This study aims to compare the outcome of single-incision multiport laparoscopic appendectomy versus conventional laparoscopic appendectomy in terms of:
• Patient recovery time
• Post-operative pain
• Wound complications
• Duration of the procedure
• Patient satisfaction as regards cosmesis.

MATERIALS AND METHODS

A randomized control study was done by alternation with a sample size of 100 which divided into two groups (study group 50 and control group 50) and study period is from April 2014 to September 2016.

Inclusion Criteria
All patients with acute appendicitis diagnosed on the basis of clinical examination, radiological correlation, and leukocytosis, presenting at our hospital above the age of 18.

Exclusion Criteria
Patient with phlegmon, mass, peri-appendicular abscess, diffuse peritonitis, age <18, pregnancy.

Patients diagnosed with acute and recurrent appendicitis planned for surgery are randomized into study group or control group by alternation. After obtaining consent, the patients are taken up for conventional laparoscopic or SILS surgery according to the randomization. Postoperatively, the following parameters are monitored.
1. Post-operative pain
2. Duration of the procedure
3. Surgical site infection
4. Patient satisfaction regarding scar.

Post-discharge, the patients were followed up with a questionnaire which are shown in Table 1.

RESULTS

The duration of the procedure (Table 2) was calculated from the time of incision to the time of the last skin stitch. It was found that the average times taken were 24.08 min for conventional surgery and 33.06 min for single-incision laparoscopy. The p value was not significant.

Pain scoring was done by using the standard visual analog scale at 6, 12, and 24 h after surgery (Table 3). It was found that the average pain score was higher in the conventional laparoscopy than the single-incision group at both 6 and 12 h after surgery. There was no significant difference at 24 h after surgery.

Surgical site infection (Table 4) according to our study was delineated as the presence of redness, warmth, and discharge with or without positive microbes being identified by culture. There were no cases of SSI in the conventional group while the single-incision group had one case of pus.

Table 1: Follow-up questionnaire

<table>
<thead>
<tr>
<th>Name:</th>
<th>Sex:</th>
<th>Date of Surgery:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Duration of procedure

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean time±Standard deviation</th>
<th>Standard error mean</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single incision</td>
<td>50</td>
<td>33.06±0.476</td>
<td>5.999</td>
<td>0.000</td>
</tr>
<tr>
<td>Conventional</td>
<td>50</td>
<td>24.08±0.510</td>
<td>5.204</td>
<td>0.000</td>
</tr>
</tbody>
</table>
skin gaping with necrosis and culture revealed *Escherichia coli*. The statistical difference was insignificant.

Patient satisfaction regarding the final scar (Table 5) was done by again using the visual analog scale. 54% of the single-incision group were happy with their scar, as compared to 42% in the conventional group. 44% in the single-incision group were satisfied with their scar while 46% were satisfied in the conventional group. Only one patient in 50 was unhappy with the scar in the single-incision group while six patients (12%) in the conventional group were unhappy with the scar.

Table 6 reveals the difference in the duration of hospital stay. It was found that the mean stay of patients in the single-incision group was 1.24 days compared to 1.50 days in the conventional group.

In Table 7, we calculated the average time taken for the patient to return to normal work. It was found that it was 4.5 days in the single-incision group versus 5.1 days in the conventional group.

**DISCUSSION**

In our study, it was observed that there was less post-operative pain in the first 6 and 12 h after the procedure in single-incision laparoscopy group than conventional laparoscopy group. However, no significant difference was noted after 24 h. Frutos *et al.*¹ say that significant difference was observed for post-operative pain with less pain reported in single-incision group. Ding *et al.*² say that single-incision laparoscopy surgery has the advantage of less post-operative pain when compared with conventional laparoscopy group. Kye *et al.*³ say that pain score on the visual analog scale on post-operative day 1 was significantly lower in the single-incision group than in the three-port group.

There was no significant difference noted in the duration of the procedure; Lee *et al.*⁴ say that no significant difference noted for mean operative time for single-incision laparoscopy group and conventional laparoscopy group. A study done by Pan *et al.*⁵ says that study did not show any difference with operative time.

One patient in single-incision laparoscopy group had wound infection which was treated with antibiotics and re-admission was not required. Dolores *et al.*¹ say that three patients in the single-port group had an asymptomatic periumbilical hematoma which did not require admission and resolve spontaneously. In conventional laparoscopy group, 2 patients had a hematoma around the surgical wound in the lower left quadrant, which did not require intervention. A study done by Pan *et al.*⁵ says that one patient in single-incision laparoscopy group had incisional hernia on follow-up.

Patient in the single-incision laparoscopy group is very happy regarding post-operative scar when compared with conventional laparoscopy group. Gasior *et al.*⁶ say that single-incision laparoscopy surgery expresses superior scar assessment. Buckley *et al.*⁷ say that patients are more happy regarding post-operative scar when compared with conventional laparoscopy group.

**CONCLUSION**

- Patient in single-incision laparoscopy group show less post-operative pain in the first 6 and 12 h compared to the conventional laparoscopy group, but no difference

---

**Table 3: Pain scoring**

<table>
<thead>
<tr>
<th>Pain score</th>
<th>Group</th>
<th>N</th>
<th>Mean±Standard deviation</th>
<th>Standard error mean</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 6 h</td>
<td>Single incision</td>
<td>50</td>
<td>1.00±0.000</td>
<td>0.000</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>50</td>
<td>1.16±0.374</td>
<td>0.374</td>
<td>0.043</td>
</tr>
<tr>
<td>At 12 h</td>
<td>Single incision</td>
<td>50</td>
<td>1.36±0.490</td>
<td>0.098</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>50</td>
<td>1.88±0.332</td>
<td>0.066</td>
<td>0.001</td>
</tr>
<tr>
<td>At 24 h</td>
<td>Single incision</td>
<td>50</td>
<td>1.00±0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Conventional</td>
<td>50</td>
<td>1.00±0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Table 4: Surgical site infection**

<table>
<thead>
<tr>
<th>Surgical site infection</th>
<th>Single-incision appendectomy (50)</th>
<th>Conventional appendectomy (50)</th>
<th>Total (100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>49</td>
<td>50</td>
<td>99</td>
</tr>
<tr>
<td>Present</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 5: Patient satisfaction regarding scar**

<table>
<thead>
<tr>
<th>Cosmetic grade</th>
<th>Single incision (%)</th>
<th>Conventional (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>27 (54)</td>
<td>21 (42)</td>
<td>48</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>22 (44)</td>
<td>23 (46)</td>
<td>45</td>
</tr>
<tr>
<td>Not satisfactory</td>
<td>1 (2)</td>
<td>6 (12)</td>
<td>7</td>
</tr>
</tbody>
</table>

**Table 6: Duration of hospital stay**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean±Standard deviation</th>
<th>Standard error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single incision</td>
<td>50</td>
<td>1.24±0.431</td>
<td>0.61</td>
</tr>
<tr>
<td>Conventional</td>
<td>50</td>
<td>1.50±0.505</td>
<td>0.71</td>
</tr>
</tbody>
</table>

**Table 7: Return to normal work**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single incision</td>
<td>50</td>
<td>4.5</td>
</tr>
<tr>
<td>Conventional</td>
<td>50</td>
<td>5.1</td>
</tr>
</tbody>
</table>
was noticed between the two groups after 24 h
• No significant difference in operating times was noted between the procedures
• One patient in 50 who underwent single-incision laparoscopy had wound infection, but no wound complications were noted in the conventional appendectomy group
• Patients underwent single-incision laparoscopy are more happy with scar when compared with conventional laparoscopy group
• No difference noted in the duration of post-operative hospital stay
• Time to return to normal work in both groups were similar
• With these above findings, our conclusion is that the single-incision multiport laparoscopic appendectomy has as many benefits as conventional laparoscopic appendectomy and can be treated as a safe and viable option for a patient with appendicitis.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Evaluation of Graft Clarity Post-penetrating Keratoplasty

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Abstract

Introduction: Penetrating keratoplasty (PK) is the most commonly performed method of corneal transplantation. It is performed for central deep opacities in the visual axis, keratoconus, and disorders affecting the corneal endothelium resulting in cornea edema and loss of corneal clarity.

Materials and Methods: A prospective, clinical study was carried out at D. Y. Patil Medical College, Navi Mumbai, which included 50 patients who were planned to undergo a full thickness PK for various corneal pathologies. Pre-operative investigations and examinations were conducted and informed written consent was taken before the procedure. A full thickness PK was performed. Postoperative follow-up was done on day 1, day 7, day 28, monthly up to 3 months and 3 monthly up to 1 year. The post-operative visual acuity, clarity of the graft, and complications encountered were compared.

Results: Of the 50 patients included in the study, 23 patients underwent only PK surgery, 10 patients underwent the triple procedure (PK + cataract extraction + intraocular lens implantation), and 17 patients underwent PK with other procedures. On subsequent follow-up at day 28, there was a clear graft in 41 patients (82%). There was epithelial graft rejection in 1 patient (2%) of Stevens Johnsons Syndrome. There was endothelial graft rejection in 2 patients (4%) of viral corneal ulcer and previous failed graft. There was glaucoma in 1 patient (2%). Severe astigmatism was noticed in 24 patients (48%). At the end of 1 year, we lost one patient to follow-up. Among the 49 patients, there was a clear graft in 35 patients (70%). There was glaucoma in 2 patients (4%). Severe astigmatism with a clear graft was noticed in 6 patients (12%). There was endothelial graft rejection in 10 patients (20%).

Conclusion: The short-term success and survival of corneal grafts in this part of the developing world are reasonably good. By taking care of the pre- and post-operative factors responsible for graft rejection, our study has validated the normally accepted facts regarding outcome and survival of corneal grafts. Age, gender, indications for surgery, corneal graft diameter, and intraoperative vitreous loss had no significant effects on the outcome.

Key words: Corneal opacity, Corneal transplantation, Corneal ulcer, Graft clarity, Graft rejection, Penetrating keratoplasty

INTRODUCTION

Penetrating keratoplasty (PK) is the most commonly performed method of corneal transplantation. It is performed for central deep opacities in the visual axis, keratoconus, and disorders affecting the corneal endothelium resulting in cornea edema and loss of corneal clarity. It scores over lamellar procedures due to their steep learning curve and nonavailability of cut tissue at eye bank centers.¹³

Visual loss in the cornea may be the result of edema, opacity, scarring or an irregular surface. PK can yield excellent visual acuity, but it is more prone to serious intraocular complications and a higher rate of rejection compared with the lamellar procedure. It is imperative to watch for signs of graft rejection or failure.⁴¹⁰

MATERIALS AND METHODS

A prospective, clinical study was carried out at D. Y. Patil Medical College and Research Centre, Navi Mumbai, from January 2011 to December 2016.

Corresponding Author: Dr. Lanin Chen, Department of Ophthalmology, D. Y. Patil Medical College & Research Centre, Nerul Sector 5, Navi Mumbai - 400 706, Maharashtra, India. Phone: +91-9819607663. E-mail: lanin_chen@hotmail.com
A total of 50 patients who were planned to undergo a full thickness PK for various corneal pathologies were included in the study.

Pre-operative evaluation was done which included the following:
1. Detailed history
2. Visual acuity on the Snellen’s chart. Perception of light and projection of rays (PLPR) were accurately documented
3. Objective refraction including retinoscopy and automated refraction
4. Automated keratometry
5. Corneal topography by Keratron scout topographer
6. Ultrasound B-scan to rule out fundus pathology
7. Intraocular lens (IOL) power calculation wherever indicated
8. Applanation tonometry by Goldmann’s tonometer or tonopen
9. Schirmer’s test
10. Corneal sensitivity to rule out the previous herpes infection.

**Inclusion Criteria**
1. Pseudophakic bullous keratopathy
2. Macular/leucomatous corneal opacity involving the visual axis
3. Corneal dystrophies
4. Corneal degenerations
5. Epithelial ingrowth/fibrovascular downgrowth
6. Impending corneal perforation/descemetocele/corneal perforation
7. Nonhealing corneal ulcer.

**Exclusion Criteria**
1. Nebular corneal opacity
2. Corneal opacity not involving the visual axis
3. Unfit for surgery due to systemic illness or debilitating diseases
4. Unwilling for consent/patient not compliant/unwilling for follow-up.

In situ, corneoscleral rim excision was done for all eye donations, and donor tissue was collected in M.K. medium with all aseptic precautions. Tissue evaluation was done by slit lamp observation and specular microscopy. Donor cornea of good endothelial cell count >2500 cells/cu.mm was obtained from the eye bank.

A full thickness PK under local/general anesthesia was done by the same surgeon on a quiet eye after a well-informed written consent.

**Surgical Technique**
Most surgeries were done under peribulbar anesthesia with 2 patients (under the age of 18 years) requiring general anesthesia.

Lid stitches were taken with silk suture, and the cornea was exposed. Eye speculum was avoided to prevent inadvertent pressure on the globe. Flieringa ring was used where indicated.

The donor cornea was trephined using manual corneal trephine of size 7.5, 8.0, 8.5, or 9.0 depending on the size of the corneal opacity and underlying corneal pathology.

The recipient cornea was trephined using manual corneal trephine of a size 0.5 mm smaller than the corneal trephine used to trephine the donor cornea. This discrepancy was to have a well formed anterior chamber (AC) to avoid peripheral anterior synechiae (PAS) in the angle leading to secondary glaucoma, inflammation, and vascularization.

The recipient diseased tissue was separated using corneoscleral scissors after trephination and initial entry with the trephine. A complete penetration of trephine was avoided to prevent injury to the iris and underlying lens.

The iris and lens (clear lens or IOL) were protected with the help of viscoelastic substance (VES) while cutting with scissor.

In cases of cataract, it was treated by extracapsular cataract extraction/posterior chamber IOL polymethylmethacrylate rigid implantation open-sky technique.

The donor cornea was placed on the defect immediately after removing the diseased recipient cornea, and interrupted sutures were taken with 10-0 monofilament nylon at 6, 12, 3, and 9 O’clock positions to prevent a scleral collapse with subsequent vitreous loss.

Thereafter, the entire graft was secured with 16 interrupted sutures with 10-0 interrupted monofilament nylon.

A patent peripheral button-hole iridectomy was done to prevent a postoperative pupillary block.

Before the last suture, an AC wash was given to remove the VES, and the angle was swept with an iris repositor to break any PAS.

AC was formed with an air bubble, and a well-formed AC depth was ensured.
Keratoscopic end-point following suturing was observed to minimize astigmatism.

A topical antibiotic eye drop, corticosteroid eye drop, and eye ointment atropine were instilled, and the eye was padded.

Postoperatively, the patients were started on the following:
1. Topical antibiotic drops - eye drop moxifloxacin 0.5% 4 times/day
2. Topical steroid drops - eye drop prednisolone acetate 1% 6 times/day which was tapered after 4 weeks with the introduction of cycloimmune 0.1%/taerolimus 0.03% twice/day
3. Topical lubricant drops 4 times/day
4. Eye ointment atropine 1% twice/day
5. Topical antiglaucoma drops – B-blocker – eye drop timolol 0.5% twice/day
6. Oral broad spectrum antibiotic – ciprofloxacin 500 mg twice/day × 5 days
7. Oral nonsteroidal anti-inflammatory drug – diclofenac sodium 50 mg twice/day × 3 days
8. Oral corticosteroid – prednisolone 1 mg/kg × 4 weeks and tapered to a maintenance dose of 10 mg over 6-8 weeks.

Additional treatment was added depending on the corneal pathology. This included,
• Antibacterial treatment with moxifloxacin 0.5% 6 times/day with Tobramycin 0.3% 6 times/day
• Topical acyclovir 3% eye ointment 5 times/day and oral acyclovir 800 mg 5 times/day × 7 days tapered to 400 mg twice/day × 6 months, for cases of corneal ulcer of viral origin or patients with non-healing corneal ulcer with absent corneal sensations
• Topical amphotericin B eye drops 0.15% every 1 hourly for corneal ulcers of fungal origin.

A judicious judgment of tapering antimicrobial and introducing topical steroid to make a therapeutic PK into optical one if possible without reactivating infection in the graft.

In case of raised intraocular pressure (IOP), a trabeculectomy with mitomycin C was done before PK to avoid post-PK glaucoma. However, few cases underwent trabeculectomy with mitomycin C post-PK surgery due to raised IOP.

Combined procedures with cataract extraction, IOL implantation, IOL explantation, etc., were also included in the study.

Follow-up was done on day 1, day 7, and day 28. From then on the patient was evaluated every 3 months up to 1 year.

The following was examined at every follow-up:
1. Objective refraction
2. Best-corrected visual acuity
3. Keratometry
4. Corneal topography
5. Slit lamp examination
6. Intraocular pressure
7. Schirmer's test/tear film break-up time.

The graft clarity was evaluated based on slit lamp examination looking for the following:
1. Fresh keratic precipitates (KP)
2. Corneal edema
3. Descemet's folds
4. Pigments/blood stain on endothelium
5. Epithelial line
6. Subepithelial haze – Krachmer spots
7. Stromal haze
8. Linear stromal opacification – Khodadoust line.

Graft clarity was graded as Grade 4 if grafts were optically clear with excellent view of iris details, Grade 2-3 (borderline) if there was moderate to significant corneal haze with or without good view of iris details, and Grade 1-0 (failed) for opaque grafts with poor view of iris and anterior segment details. Good visual improvement was defined as postoperative vision improvement ≥two lines on Snellen’s compared with pre-operative vision, moderate as one line improvement, and No improvement if vision remained same or worsened.

Graft failure was defined as irreversible loss of optical clarity with the date of onset taken when the patient presented to cornea clinic with signs of irreversible rejection (for 3 months or more) or with failed graft.

**RESULTS**

The mean age of the patient was 48 years, with the oldest patient as 87 years and youngest patient as nine years. Of the 50 patients, 32 were female and 18 were male.

The most common indications (Graph 1) for surgery were corneal scarring (40%), bullous keratopathy (28%), non-healing corneal ulcer (16%), and others (16%) (Figures 1 and 2).

Of the 50 patients included in the study, 23 patients (46%) underwent only PK surgery, 10 patients (20%) underwent triple procedure (PK + cataract extraction + IOL implantation), and 6 patients (12%) underwent PK with other procedures such as IOL exchange, anterior vitrectomy, or secondary IOL implantation (Table 1).
Pre-operative visual acuity was worse than CF 2 m in all patients (100%), with only 8 patients (16%) having a visual acuity better than PLPR.

There was a vitreous loss in 1 patient during the PK procedure. A retropupillary iris claw was implanted in this patient after a neat anterior vitrectomy. Iatrogenic iris bleeding was seen in 3 patients. Positive intraocular pressure was experienced in 1 patient intra-operatively due to scleral prolapse. An immediate graft placement with 4 anchoring sutures averted a vitreous loss. May be a Flerringa ring could have avoided this.

On post-operative day 1 (Graph 2), the graft remained clear in 23 patients (46%), corneal edema in 12 patients (24%), pigments on the endothelium in 8 patients (16%), hyphema in 1 patient (2%), and intraocular inflammation and raised IOP in 6 patients (12%) (Figure 3).

On subsequent follow-up at day 28 (Graph 3), there was a clear graft in 41 patients (82%). There was epithelial graft rejection in 1 patient (2%) of Steven–Johnsons syndrome. There was endothelial graft rejection in 2 patients (4%) of viral corneal ulcer and previous failed graft. There was glaucoma in 1 patient (2%). Severe astigmatism was noticed in 24 patients (48%).

Overall, grafts remained clear at follow-up visits. Glaucoma or postoperative glaucoma had no statistically significant effects on graft outcome as all patients susceptible to glaucoma underwent trabeculectomy with mitomycin C, and all patients were started on post-operative anti-glaucoma eye drops.

At the end of 1 year (Graph 4), one patient was lost to follow-up. Among the 49 patients, there was a clear graft in 35 patients (70%). There was glaucoma in 2 patients (4%). Severe astigmatism with a clear graft was noticed in 6 patients (12%). There was endothelial graft rejection in 10 patients (20%) (Figure 4).

The post-operative visual acuity at the end of a 1-year follow-up was between 6/18 to 6/60 in 38% followed by better than 6/18 in 36% on the Snellen’s chart (Table 2).

There is a variety of reasons for this. In our series, only one-half of our cases were good prognosis cases such as corneal dystrophies, keratoconus, etc. Few of our patients are high-risk cases, which are at increased immunological risk of graft rejection due to factors such as vascularized corneas, previous graft failure. Second, most of our corneal collection is through voluntary eye donations by home calls.
our donors being in the age group 60 years and above, with average quality of donor tissue and comparatively lower endothelial cell counts.\textsuperscript{1,2} Hospital Cornea Retrieval Programs more often give a higher yield and younger donor tissue. In addition, majority of our patients are illiterate with poor socioeconomic status. Hence, post-operative care and follow-up were a major challenge.

**DISCUSSION**

Corneal transplant surgery is the most commonly performed allograft and is said to be the most successful solid organ transplants, with short-term survival rates (1 year) as high as 90%.\textsuperscript{3} However, the long-term success rate diminishes to 73% at 5 years, 60% at 10 years, and 46% at 15 years as reported in ACGR.\textsuperscript{4} Reports from various graft registries of the developed countries show the indications for surgery being mainly keratoconus, other corneal dystrophies, followed by aphakic and pseudophakic bullous keratopathies.\textsuperscript{2,3} However, the scenario in developing world is quite different. First, the patient profile and indications for surgery differ. According to a study done in Nepal, corneal scars following infectious keratitis, adherent leukomas, and corneal perforations were the major indications for surgery.\textsuperscript{5} A study done in India to analyze survival rate of corneal transplants in a large series shows survival rates at 1, 2, and 5 years for first-time grafts to be 79.6%, 68.7%, and 46.5%, respectively.\textsuperscript{6} They are different from the western studies essentially due to differences in patient profile, different indications for surgery, differences in methods of storage of corneas, and socioeconomic factors affecting health-care provision.

Graft failure is defined as irreversible loss of central graft clarity, irrespective of the visual acuity. Graft rejection was defined as presence of one or more of the following signs: Mild if there were 1-5 KP, sub-epithelial infiltrates increased corneal thickness without increase in aqueous cells. Severe rejection if >5 KPs, inflammatory cells in the stroma (not due to infection), endothelial rejection line or increased thickness with aqueous cells.

Factors determining the clarity of graft can be categorized as:

- Poor endothelial count in the donor graft
- Indication of the graft
  - Therapeutic
  - Staining of the cornea
  - Herpes infection
  - Fibrovascular ingrowth
- Recipient corneal vascularization >180°
- Uncontrolled glaucoma
- Inflammation
- Cataract needing a combined procedure
- Ocular surface disorders
- Decreased corneal sensations
- Debilitating diseases
  - Uncontrolled diabetes mellitus
  - Tuberculosis
  - HIV
  - Collagen vascular disorders
- Vitreous loss with vitreous in AC.

The study was done in a tertiary care center wherein an eye bank exists. The tissue was collected with good

<table>
<thead>
<tr>
<th>Visual acuity on Snellen’s chart</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;6/18</td>
<td>12 (24)</td>
</tr>
<tr>
<td>6/18-6/60</td>
<td>19 (38)</td>
</tr>
<tr>
<td>CF 5 m to CF 2 m</td>
<td>12 (24)</td>
</tr>
<tr>
<td>&lt;CF 2 m</td>
<td>7 (14)</td>
</tr>
</tbody>
</table>
endothelial cell count. The confounding factors such as dry eyes, glaucoma, inflammation, and vascularization were controlled rigidly to avoid any mishap. The steroids were tapered and immunosuppressants introduced to prevent steroid-related complications. A competent surgeon did the PK. Most of the factors contributing to graft failure were controlled. The factor contributing to graft rejection seemed to be non-compliance on the patient part of frequent follow-up and to putting so many drops in the eye over a long period. The second one seemed to be reactivation of herpes infection in the eye. The epithelial rejection was seen in the switch over from steroids to immunosuppressants. However, it was well controlled with reintroduction of steroids. Hence, the dictum to introduce both steroids as well as immunosuppressants and then slowly tapers the steroids. Astigmatism was seen in all the patients. To reduce this, we introduced keratoscopic endpoint during surgery. At 3 months removal of the steep suture if astigmatism >4D and to continue this every 2 weeks till we got the astigmatism below 3D. With this, the BCVA in a clear graft was almost always better than 6/12.

Suture infiltrate was avoided by removing loose suture at follow-up. If present then, they were treated with dilute betadine drops in addition to the regular treatment. With this protocol, we managed a graft survival rate 75% of over a period of 1 year.

There are several limitations to our study. We did not assess in details the effect of several donor tissue-related variables such as death to in situ excision time, preservation time, age of the donor, human leukocyte antigen matching, or ABO grouping of donor-recipient.

**CONCLUSION**

The short-term success and survival of corneal grafts in this part of the developing world are reasonably good. By taking care of the pre-operative and post-operative factors responsible for graft rejection, our study has validated the normally accepted facts regarding outcome and survival of corneal grafts. Age, gender, indications for surgery, corneal graft diameter, and intraoperative vitreous loss had no statistically significant effects on the PK outcome. Further improvements in eye banking facilities, adopting hospital cornea retrieval program to procure young donor corneas, and better patient counseling to ensure good follow-up are needed to improve long-term survival of corneal grafts.

**REFERENCES**


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

The femur is the largest and strongest bone in the human body. Its proximal part and the pelvis constitute the hip joint, and its distal part constitutes part of the knee joint. It forms the skeleton of the thigh, bears body weight in an erect posture, supports the movements of legs, provides attachment to muscles, forms blood cells, and acts as storehouse for calcium and phosphate. Therefore, the femur is widely researched in the fields such as physical and forensic anthropology, human kinematics, and orthopedics. The anatomical knowledge of different dimensions of the femur is very essential in anthropological and medico-legal practice for sex determination and as well as to radiologists, rheumatologists, and orthopedic surgeons for diagnosis and planning of treatment. As the femur is composed of hard tissue, they are the best-preserved part of skeleton after death, and in many times, they are the only available parts for forensic examination. The femoral normative values are also essential to plastic and reconstructive surgeons in their reconstruction and medical rehabilitation. Femoral neck anteversion (FNA) angle is widely recognized as an important factor for hip stability since anatomists and orthopedics have long been interested in this. It is multifactorial result of evolution, hereditary, fetal development, intrauterine position, and mechanical forces.

MATERIALS AND METHODS

This was an observational descriptive type of study which was performed on 80 fully ossified human femur bones (40 right sided and 40 left sided) collected from Department of Anatomy, SGT Medical College, Gurgaon, Haryana. Instruments used for taking measurement were white.
Deswal, et al.: Measurement of Angles of Femur Bone

Parameters Studied Were

**Collo-diaphyseal angle (CDA)**

The collo-diaphyseal angle is the angle between the longitudinal axis of the neck and the longitudinal axis of the shaft.

**FNA**

It is the angle formed by the femoral condyles plane (bicondylar plane) and a plane passing through the center of the neck and femoral head. If the axis of the neck inclines forward to transcondylar plane, the angle of torsion is called anteversion. The specimen is placed at the edge of a glass horizontal surface so that the condyles of the inferior end rest on the surface. The horizontal limb of a goniometer was fixed at the edge of the experimental table. The vertical limb will be held parallel along the axis of the head and neck of the femur. The horizontal surface represents the retrocondylar axis and the plane of reference against which the anteversion is measured with the help of the axis of the head of the femur. The angle subtended will be recorded.

**RESULTS**

In the present study, average CDA was found to be 126.10 ± 6.56 and 126.20 ± 5.23 on the right and left sides, respectively. The average anteversion recorded was 19.75 ± 7.75 and 15.75 ± 7.13 on the right and left sides, respectively (Table 1).

**DISCUSSION**

The average CDA is greater at birth, on average 160 and decreases along the skeletal growth, reaching an average of 135 of the adults. This average value is used as reference for the manufacture of orthopedic implants used in synthesis or substitution in the proximal femur. In the present study, the average CDA was found higher on the left sides than right sides similar to the finding of Da Silva et al., but not resembling to the findings of Hoaglund and Low7 and Shakil and Saheb. The findings of the present study were nearly equal to the findings of Parsons, Isaac et al., and Ravichandran et al. The findings of the present study were nearly equal to the findings of Parsons, Isaac et al., and Ravichandran et al. Table 2 shows the comparison of the findings of the present study with the findings of previous authors.

The FNA angle is roughly about 30-40 at birth and decreased gradually as a result of hereditary factors, torsional forces on the diaphysis created by the contraction of the muscles acting on hip joint, and the development of normal walk. In the present study, the mean values of FNA were higher on the right side than the left side similar to the findings of Ingalls. The present study showed higher FNA than the findings of previous authors Pick et al., Jain et al., Shrikant et al., and Zalawadia et al. Table 3 shows the comparisons of findings of the present study with the previous studies.

**CONCLUSION**

The knowledge of normal femoral anteversion is of extreme importance in the selection of patients for prosthesis and pre-operative planning for total hip replacement surgery and anthropological studies. In India, with the increasing demand for total hip replacement, this anteversion angle becomes more significant. Knowledge of

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDA</td>
<td>126.10±6.56</td>
<td>126.20±5.23</td>
</tr>
<tr>
<td>FNA</td>
<td>19.75±7.75</td>
<td>15.75±7.13</td>
</tr>
</tbody>
</table>

**Table 2: Comparison of CDA measured on dry bones of present study with the previous researchers**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample size</th>
<th>CDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parsons8</td>
<td>134</td>
<td>126.3±5.1</td>
</tr>
<tr>
<td>Hoaglund and Low7</td>
<td>108</td>
<td>R-136.0, L-135.0</td>
</tr>
<tr>
<td>Isaac et al.9</td>
<td>171</td>
<td>126.7</td>
</tr>
<tr>
<td>Siwach and Dahiya11</td>
<td>150</td>
<td>123±4.3</td>
</tr>
<tr>
<td>Da Silva et al. (2003)4</td>
<td>66</td>
<td>R-122.5±6.9, L-125.6±6.6</td>
</tr>
<tr>
<td>Ravichandran10</td>
<td>578</td>
<td>126.55</td>
</tr>
<tr>
<td>Subhas Gujar (2013)6</td>
<td>250</td>
<td>R-136±6.68, L-136.6±5.45</td>
</tr>
<tr>
<td>Shafik and Shafe82</td>
<td>250</td>
<td>R-137.3, L-136.9</td>
</tr>
<tr>
<td>Present study (2017)</td>
<td>80</td>
<td>R-126.10±6.56, L-126.20±5.23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample size</th>
<th>FNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingalls12</td>
<td>100</td>
<td>R-12.6, L-10.3</td>
</tr>
<tr>
<td>Pick et al.13</td>
<td>152</td>
<td>14.0</td>
</tr>
<tr>
<td>Siwach and Dahiya11</td>
<td>150</td>
<td>13.7±7.9</td>
</tr>
<tr>
<td>Jain et al.14</td>
<td>138</td>
<td>8.1±8.6</td>
</tr>
<tr>
<td>Shrikant et al.15</td>
<td>288</td>
<td>8.7±6.6</td>
</tr>
<tr>
<td>Zalawadia et al.16</td>
<td>92</td>
<td>12.4±18.4</td>
</tr>
<tr>
<td>Shrimathi et al.17</td>
<td>162</td>
<td>9.8</td>
</tr>
<tr>
<td>Present study et al. (2017)</td>
<td>80</td>
<td>R-19.75±7.75, L-15.75±7.13</td>
</tr>
</tbody>
</table>

CDA: Collo-diaphyseal angle, FNA: Femoral neck anteversion
neck-shaft angle in this region would therefore be useful to the surgeon during internal fixation of fractured neck of the femur and also in determining the sex of the individuals from skeletal remains for medico-legal reasons.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Comparison of Different Doses of Fentanyl for Attenuating Stress Response and Side Effects of Etomidate during Induction and Intubation: A Randomized Control Study

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Abstract

Introduction: Etomidate is a rapidly acting induction agent and it has little effect on cardiovascular system and it allows rapid recovery from anesthesia but associated with side effects. Pre-treatment with narcotic analgesics usually Fentanyl can decrease the incidence of pain on injection and myoclonus during induction of anesthesia with Etomidate and also attenuates the stress response to endotracheal intubation.

Objective: The objective of this study is to evaluate the efficacy of different doses of Inj. Fentanyl for attenuating the stress response and side effects of Etomidate during induction and intubation.

Methods and Methods: In this prospective randomised study 60 patients undergoing elective surgeries under general anaesthesia included in the study and they were randomly allocated into two groups of 30 each. Group I received 2 µ/kg of Fentanyl and Group II received 5 µ/kg of fentanyl. After 5 minutes of administration of either one of these all patients were induced with etomidate at a dose of 0.3 mg/kg. The parameters monitored are pain on injection, myoclonus, apnoea, heart rate, systemic blood pressure, post operative nausea and vomiting.

Results: We found that the hemodynamic response and side effects were lower in group II with increasing dose of Fentanyl. But at the same time there was increasing incidence of post operative nausea & vomiting and apnoea in group II.

Conclusion: We concluded that at a dose of 5 µg/kg of fentanyl, there is reduction of side effects of etomidate and also there is attenuation of hemodynamic response to intubation in patients undergoing elective surgeries under general anaesthesia with etomidate as induction agent.

Key words: Apnoea, Etomidate, Fentanyl, Pain on injection, Myoclonus, Stress response

INTRODUCTION

Etomidate is a carboxylated, imidazole-containing compound. Its mechanism of action is through gamma-aminobutyric acid (GABA)-A receptor which is by enhancing the affinity of GABA for these receptors.¹ It is a rapidly acting induction agent, and it has little effect on cardiovascular system, and it allows rapid recovery from anesthesia.²,³ However, in spite of these good properties, etomidate has side effects such as pain on injection, myoclonus, post-operative nausea, and vomiting (PONV). Etomidate does not have analgesic properties because of which laryngoscopy and tracheal intubation usually results in increase in heart rate and systemic blood pressure. Pre-treatment with narcotic analgesics usually fentanyl can decrease the incidence of pain on injection and myoclonus during induction of anesthesia with etomidate and also attenuates the stress response to endotracheal intubation.⁴ We designed this prospective, randomized control study to find an optimal pre-induction dose of fentanyl with etomidate as induction agent which attenuates the hemodynamic changes and side-effects during induction and intubation.

Access this article online

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

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MATERIALS AND METHODS

A total of 60 American Society of Anesthesiologists (ASA) I and II patients of age 18–60 years undergoing elective surgeries under general anesthesia were selected in this prospective, randomized, control study. To detect a 15% difference in heart rate and blood pressure, with beta error of 80% (0.8), the sample size was calculated as 60. Totally, 60 patients of ASA I and II of both sexes and age between 18 and 60 years undergoing elective surgeries under general anesthesia were included in the study. Patients with a history of chronic alcoholism, known allergy to etomidate, known allergy to fentanyl, patients on drugs which may likely to cause cardiovascular changes, obese patients (>25% of ideal body weight), and pregnant patients were excluded from the study. The Institutional Ethical Committee approval for the study was obtained. The informed written consent was obtained from the patients participating in the study was obtained.

In the operating room, appropriate equipment for the airway management and emergency drugs were kept ready. Non-invasive blood pressure monitor, pulse oximeter and electrocardiogram leads were connected to the patient. Pre-operative baseline hemodynamic variables were recorded. An IV line was secured in nonoperative limb and started with dextrose normal saline. A total of 60 Patients were enrolled in the study. The Institutional Ethical Committee approval for the study was obtained. The informed written consent was obtained from the patients participating in the study was obtained.

RESULTS

A total of 60 patients were enrolled in the study. The demographic profiles of two groups were comparable in terms of age, sex distribution, weight, and ASA physical status. The mean duration of surgery is not statistically significant between both groups (Table 1).

Heart rates at 3 min after administration of fentanyl, 2 min after administration of etomidate, and 1 min after intubation were compared between Group I and II. The increase in heart rate 1 min after intubation was lesser in Group II when compared to Group I and was found to be statistically significant (P < 0.001) (Table 2). In Group I, the increase of heart rate from baseline was 26% while in Group II, the increase of heart rate was only 10%.

Systolic and diastolic blood pressure at 3 min after administration of fentanyl, 2 min after administration of etomidate, and 1 min after intubation were compared between Group I and II. The increase in systolic and diastolic blood pressure 1 min after intubation was lesser in Group II when compared to Group I and was found to be significant (P < 0.001) (Tables 3 and 4).

Table 1: Patient characteristics (mean±SD)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group I</th>
<th>Group II</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>45.96±14.4</td>
<td>46.53±14.01</td>
<td>0.878</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>52.5±5.0</td>
<td>52.9±5.5</td>
<td>0.8471</td>
</tr>
<tr>
<td>Gender (M/F)</td>
<td>14/16</td>
<td>15/15</td>
<td>0.940</td>
</tr>
<tr>
<td>ASA I/II</td>
<td>13/17</td>
<td>17/13</td>
<td>0.2195</td>
</tr>
</tbody>
</table>

*P<0.05 is significant. SD: Standard deviation

Table 2: Heart rate variation during induction and intubation

<table>
<thead>
<tr>
<th>Heart rate</th>
<th>Mean±SD</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline values</td>
<td>84.43±4.08</td>
<td>0.523</td>
</tr>
<tr>
<td>3 min after fentanyl</td>
<td>84.17±5.74</td>
<td>0.142</td>
</tr>
<tr>
<td>2 min after etomidate</td>
<td>83.41±5.66</td>
<td>0.214</td>
</tr>
<tr>
<td>After giving suxamethonium</td>
<td>84.55±4.97</td>
<td>0.273</td>
</tr>
<tr>
<td>1 min after intubition</td>
<td>110.23±4.65</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*P<0.05 is significant. SD: Standard deviation

Table 3: Systolic blood pressure variation during induction and intubation

<table>
<thead>
<tr>
<th>Systolic blood pressure (mmHg)</th>
<th>Mean±SD</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline values</td>
<td>126.30±5.243</td>
<td>0.543</td>
</tr>
<tr>
<td>3 min after fentanyl</td>
<td>124.77±5.19</td>
<td>0.424</td>
</tr>
<tr>
<td>2 min after etomidate</td>
<td>122.76±4.81</td>
<td>0.368</td>
</tr>
<tr>
<td>After giving suxamethonium</td>
<td>124.53±5.08</td>
<td>0.148</td>
</tr>
<tr>
<td>1 min after intubition</td>
<td>157.76±8.20</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*P<0.05 is significant. SD: Standard deviation

Table 4: Diastolic blood pressure variation during induction and intubation

<table>
<thead>
<tr>
<th>Diastolic blood pressure (mmHg)</th>
<th>Mean±SD</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline values</td>
<td>75.80±3.75</td>
<td>0.465</td>
</tr>
<tr>
<td>3 min after fentanyl</td>
<td>74.50±3.67</td>
<td>0.654</td>
</tr>
<tr>
<td>2 min after etomidate</td>
<td>75.20±3.92</td>
<td>0.452</td>
</tr>
<tr>
<td>After giving suxamethonium</td>
<td>78.00±4.12</td>
<td>0.376</td>
</tr>
<tr>
<td>1 min after intubition</td>
<td>88.40±2.09</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*P<0.05 is significant. SD: Standard deviation
Mean arterial blood pressure at 3 min after administration of fentanyl, 2 min after administration of etomidate, and 1 min after intubation were compared between Group I and II. The increase in mean arterial blood pressure 1 min after intubation was lesser in Group II when compared to Group I and was found to be statistically significant \( (P < 0.001) \) (Table 5). The increase of mean arterial pressure from baseline is 15.6% in Group I while the increase is only 4.2% in Group II.

There is a significant decrease of pain on injection in Group II while there is a significant increase in PONV only 4.2% in Group II.

In a study conducted by Weiss-Bloom and Reich\(^5\) has been demonstrated that 5-10 \( \mu g/kg \) of fentanyl given before administering etomidate blunt the hemodynamic response to anesthetic induction and tracheal intubation. These findings were well correlated with our study, in which fentanyl 5 \( \mu g/kg \) blunt the hemodynamic response to anesthetic induction and tracheal intubation.

In another study conducted by Stockham \( et \ al.\)\(^7\) fentanyl dosage of up to 500 \( \mu g \) are used, and they concluded that the hemodynamic response to induction-intubation sequence with etomidate as induction agent can be completely eliminated by high dosage of fentanyl of up to 10 \( \mu g/kg \). In a study conducted by Zhang and Sun\(^8\) even a low dose of fentanyl (1 \( \mu g/kg \)) are effective in blunting the hemodynamic response to intubation with etomidate as induction agent. In a study conducted by Casati \( et \ al.\)\(^9\) doses of fentanyl of 3 \( \mu g/kg \) are effective in blunting the hemodynamic responses to intubation with etomidate as induction agent. These findings, when combined with the results of our study, suggest that an optimal pre-induction dose of fentanyl (5 \( \mu g/kg \)) attenuates the increase in heart rate and blood pressure during induction-intubation sequence with etomidate. Hence, our study, it can be suggested that on further increasing the dose of fentanyl, it may be possible to completely eliminate the hemodynamic response to induction intubation sequence with etomidate.

### DISCUSSION

Several studies demonstrated that pain on injection, myoclonus, and increase in arterial blood pressure and heart rate during laryngoscopy and endotracheal intubation can be minimized following pre-treatment with fentanyl. The results of our study demonstrate that increasing the pre-induction dose of fentanyl is more effective at minimizing the side-effects of etomidate. However, at the same time, higher pre-treatment doses of fentanyl also cause a high incidence of apnea and also PONV.

In this study, pre-treatment with fentanyl did not cause chest wall rigidity in any patient. While these findings indicate that the incidence of rigidity is low with even 5 \( \mu g/kg \) of fentanyl, it probably is not absent as other studies have described rigidity with even low dose of fentanyl.

Similarity, in this study, no patient required a narcotic antagonist either immediately after surgery or in the recovery room, also nobody needed mechanical ventilation post-operatively. However, it does not mean that respiratory depression sufficient to require mechanical ventilation or requirement of a narcotic antagonist for reversal of opioid might not be an occasional occurrence.

In a study conducted by Ko \( et \ al.\)\(^5\) demonstrated that pre-treatment with fentanyl effectively suppresses the incidence of myoclonus after etomidate administration. This finding was well correlated with our study, in which the incidence of myoclonus was less with higher dose of fentanyl.

### CONCLUSION

Our study indicates that the effectiveness of fentanyl in reducing the side-effects of etomidate and attenuating the hemodynamic responses associated with the induction intubation sequence is dose-dependent. The data suggest that 5 \( \mu g/kg \) of fentanyl pretreatment reduces the incidence of myoclonus, pain on injection, and increases in heart rate and blood pressure during the induction-intubation sequence in ASA class I and II patients but produce a high incidence of PONV and may cause apnea.

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**Table 5: Mean arterial blood pressure variation during induction and intubation**

<table>
<thead>
<tr>
<th>Mean arterial blood pressure (mmHg)</th>
<th>Mean±SD</th>
<th>( P ) value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline values</td>
<td>92.63±3.59</td>
<td>92.53±3.62</td>
</tr>
<tr>
<td>3 min after fentanyl</td>
<td>90.94±3.36</td>
<td>90.72±3.42</td>
</tr>
<tr>
<td>2 mins after etomidate</td>
<td>91.42±3.12</td>
<td>90.92±3.98</td>
</tr>
<tr>
<td>After giving suxamethonium</td>
<td>93.51±4.65</td>
<td>92.25±3.65</td>
</tr>
<tr>
<td>1 min after intubation</td>
<td>111.52±6.53</td>
<td>100.75±4.44</td>
</tr>
</tbody>
</table>

*\( P < 0.05 \) is significant. SD: Standard deviation

**Table 6: Side effects of etomidate**

<table>
<thead>
<tr>
<th>Side effects</th>
<th>Pain on injection</th>
<th>Myoclonus</th>
<th>Apnea</th>
<th>PONV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Group II</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>( P ) value*</td>
<td>0.044</td>
<td>0.501</td>
<td>0.271</td>
<td>0.049</td>
</tr>
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</table>

*\( P < 0.05 \) is significant. PONV: Postoperative nausea and vomiting
REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Spirometry Evaluation of Asymptomatic Non-Smoking Overweight and Obese Subjects

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Abstract

Introduction: Obesity has a significant impact on the respiratory function. In this study, we attempt to find a relation between the body mass index (BMI) and spirometry findings in healthy, non-smoking adults from North Kerala.

Materials and Methods: Totally, 100 healthy non-smoking adults with BMI more than 25 were evaluated over 1 year with a detailed history, clinical examination, and spirometry. Data were evaluated using statistical software service provisioning system software version 21 for correlation between BMI and spirometry.

Results: Out of 100 adults, 72 were males, and 28 were females. 63 adults were overweight, 31 had mild obesity, and 6 had moderate obesity. In the overweight group, 48 had restrictive anomaly, 2 had mixed anomaly, and 13 was normal. In the mild obesity group, 24 had restrictive anomaly, 2 had mixed anomaly, and 5 had normal spirometry. In the moderate obesity group, 3 had restrictive anomaly, 1 had mixed anomaly, and 2 had normal spirometry. There was a significant association between abnormal spirometry and BMI in both the overweight and obese groups. We could not find a significant association between the BMI and degree of restriction in any of the groups.

Conclusion: Overweight as well as obese adults had abnormal spirometry in our study. There was no correlation between the degree of obesity and spirometry values. Hence, we conclude that even a small reduction in weight can improve the pulmonary function.

Key words: Obesity, Pulmonary, Restriction, Spirometry

INTRODUCTION

Obesity is a chronic condition characterized by excessive accumulation of body fat that is harmful to individuals. Obesity increases the risk of cardiovascular disease, hypertension, metabolic disorders, and respiratory dysfunction. Obesity is often expressed in terms of body mass index (BMI) which is used to classify obesity. It is calculated as weight in kg divided by square of height of a person in meters (kg/m²).

The WHO classified obesity as follows BMI of 18-24.9 kg/m² is considered as normal weight. BMI of 25.00-29.9 kg/m² is considered overweight, and BMI 30 or more is considered as obese.

Obesity can alter respiratory physiology leading to abnormalities in resistance, ventilation and perfusion relationships, workload of the respiratory muscles, upper airway caliber and tone, ventilator control and pulmonary, and chest wall compliance. Obesity affects various resting respiratory parameters such as compliance, neuromuscular strength, work of breathing, spirometry measurements, respiratory resistance, diffusing capacity, and gas exchange and reduces respiratory muscle strength and efficiency of respiratory muscles, especially the diaphragm.

The most common pulmonary function abnormality in obese adults is the reduction in the expiratory reserve volume. In general, in mild obesity, spirometry is normal. As BMI increases, there is a decrease in forced expiratory volume 1 (FEV1) and forced vital capacity (FVC),
rendering the FEV1 to FVC ratio normal. Lazarus et al found that FEV1/FVC ratio decreases with increase in BMI in overweight and obese individuals,2 Biring et al found a reduction in the forced expiratory flow 25-75% (Mid-expiratory flows) and the FEV1/FVC ratio. Thus, spirometry abnormalities in mild to moderate obesities represent restrictive anomaly whereas with severe and morbid obesity, it may represent true airflow obstruction.3

Spirometry is a key test that is used to assess respiratory efficiency of an individual. The factors that affect spirometry are age, height, weight, gender, ethnicity, or race. Three key spirometry measurements are FVC, FEV1 s, and FEV1/FVC ratio. For each individual, values are compared to standard reference value American thoracic society guidelines. Many studies have shown restrictive ventilatory impairment in obesity with reductions in FEV1, FVC, total lung capacity, functional residual capacity (FRC), and expiratory reserve volume. In this study, we are assessing the spirometry values of healthy non-smoking overweight and obese individuals. We have excluded severe and morbid obese patients from our study.

MATERIALS AND METHODS

Setting
This study was conducted in the Department of Respiratory Medicine, Kannur Medical College.

Period of Study
The duration of the study was 12 months.

Study Design
This was an observational study.

Inclusion Criteria
Healthy adults with no respiratory symptoms between the age group of 20-60 years.

BMI more than 25 kg/m².

No history of smoking in the last 10 years.

Exclusion Criteria
Any adult with respiratory symptoms in the last 1 month.

Any adult with severe or morbid obesity.

100 patients were evaluated with spirometry using COSMED Omnia cardiopulmonary diagnostic suite. The FEV1, FVC, FEV1/FVC ratio, and peak expiratory flow rate were recorded. The relation between BMI and spirometry values was assessed. The suitable advice was given for weight reduction. Relation of spirometry to sex and degree of restriction was also assessed. Suitable advice for weight reduction and counseling was given to all patients.

RESULTS

The following are observations made in 100 adults over a period of 12 months.

Age
The mean age at presentation was 41.21 ± 9.37. The maximum no of subjects belong to age group 41-60 years.

Sex
The study group was formed by 72% males and 28% females (Figure 1).

BMI
Nearly, 63% of patients belong to overweight group BMI (25-29.9 kg/m²), 31% belonged to mild obesity (Class I) (30-34.9 kg/m²), 6% belonged to moderate obesity (Class II) (35-39.9 kg/m²). The mean BMI was 29.26 ± 2.72 (Table 1).

Spirometry

Among 100 subjects, 20% had normal spirometry, and 80% had abnormal spirometry. In those with abnormal spirometry, the most common pattern was restrictive (75%) and (5%) mixed.

Table 1: Patients with normal and abnormal spirometry in different BMI groups

<table>
<thead>
<tr>
<th>BMI</th>
<th>Normal spirometry</th>
<th>Abnormal spirometry</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29.9</td>
<td>13</td>
<td>50</td>
<td>63</td>
</tr>
<tr>
<td>≥30</td>
<td>7</td>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

BMI: Body mass index

Figure 1: Pie diagram showing percentage of males and females in the study
Among 72 male subjects, 57 had abnormal spirometry (79.1%) and 15 adults had normal spirometry (20.8%). Among 28 female subjects, 23 had abnormal spirometry (82.14%), and 5 had normal spirometry (17.8%) (Table 2).

In overweight (63 subjects), 13 had normal spirometry (20.6%), 50 had abnormal spirometry (79.4%). 28 subjects had mild restriction (44.4%), 20 had moderate restriction (31.7%), 2 had mixed anomaly (3%).

In mild obesity (31 subjects), 5 had normal spirometry (16.1%), 26 had abnormal spirometry (83.9%). Among abnormal spirometry, 10 had mild restriction (32.3%), 14 had moderate restriction (45.2%), and 2 had mixed anomaly (6.5%).

In adults with moderate obesity (6 subjects), 2 had normal spirometry (33.3%), 3 had moderate restriction (50%), and 1 had mixed anomaly (16.7%).

Adults with BMI more than 25 had significantly abnormal spirometry values ($P < 0.05$). Overweight adults and obese adults when evaluated separately also had a significantly abnormal spirometry ($P = 0.0008$ for overweight subjects and $P = 0.001$ for obese patients) (Table 3).

There was no significant association between increase in BMI and the degree of restriction in each group ($P = 0.55$) implying that increased obesity did not show a greater degree of restriction.

There was no statistical association between the type of anomaly and BMI in each of the groups.

## DISCUSSION

There have been many studies to assess the relation between pulmonary function test (PFT) and obesity. Most of the studies have targeted the obese adults with a BMI of more than 30 kg/m² in their studies. In our study, we have attempted to study the correlation between overweight adults and the impact of even a slight increase in BMI on the pulmonary function. In a study conducted by Prajapathi et al., they concluded that more than half of the patients were having abnormal PFT, and increase in BMI was associated with increase in abnormal PFT pattern. In this study, we have included both overweight and obese, and of the overweight, 79.3% had abnormal spirometry, and of the obese, 81.08% had abnormal spirometry.

Al-Gobain, on the effect of obesity on healthy non-smoking adults, concluded that obesity has no effects on spirometry tests and recommended alternative diagnosis in case of finding abnormal spirometry results among obese adults. We got contrasting results with predominantly restrictive anomaly in both overweight and obese subjects.

Another study conducted by Devershetty et al. concluded that obesity has an impact on respiratory functions even in younger age group. This study was done exclusively on 60 healthy females, in this study, we have included 28 females and found abnormal results in 23(82.1%).

Li et al. conducted a study which concluded that reduction in FRC and diffusion impairment was most common abnormality in obese patients. In our study, we have not included these parameters.

Thyagarajan et al. conducted a longitudinal study on the effect of obesity with BMI and found that the age-related decline in vital capacity was significantly higher in overweight and obese patients compared to subjects with normal BMI. In this study, we could not make out significant decline in pulmonary function in the higher age groups even though ours was not a longitudinal study.

Pakkala and Pakkala in a study conducted in South India found that FEV1, FVC, and FEV1/FVC were significantly lower in obese compared to non-obese adults. In our study, even though we could not find a specific correlation between BMI and spirometry parameters of FEV1, FVC, and FEV1/FVC; we could make out a significant correlation between increased BMI and abnormal spirometry. Most of the subjects had restrictive anomalies ranging from mild

## Table 2: Sex differentiation of different age, BMI and spirometry groups

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-40</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>41-60</td>
<td>37</td>
<td>18</td>
</tr>
<tr>
<td>25-29.9</td>
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<td>13</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-34.9</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>≥35</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Spirometry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Restrictive</td>
<td>53</td>
<td>22</td>
</tr>
<tr>
<td>Mixed</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

BMI: Body mass index

## Table 3: Relation between BMI and spirometry pattern

<table>
<thead>
<tr>
<th>BMI</th>
<th>Restrictive</th>
<th>Normal</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29.9</td>
<td>28</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>30-34.9</td>
<td>10</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>≥35</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

BMI: Body mass index
to moderate, and a few had mixed anomalies. There was no correlation between the rise in BMI and the level of restriction.

Thus, from our observations, we conclude that even a mild increase in BMI (overweight) may contribute to a deterioration of pulmonary function. This may be overlooked in patients who have no obvious respiratory symptoms. From the other studies, this decreased respiratory pulmonary function may progress with age. Hence, weight loss of even few kilograms may go a long way in improving pulmonary function and reducing respiratory comorbidities.

Hence, it becomes imperative that the pulmonary function should be monitored in overweight and obese subjects even if they are apparently healthy and have no respiratory symptoms.

**CONCLUSION**

In our study, overweight and obese subjects had abnormal spirometry, mostly restrictive, and mixed, despite having no respiratory symptoms. We could not make out any association between the increase in BMI and level of restriction. As even overweight subjects had significantly abnormal pulmonary function, we suggest that even mild weight reduction may help in improving pulmonary function. We also suggest regular spirometry analysis and counseling in overweight and obese adults even if they have no respiratory symptoms.

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.
A Clinical Study of Blunt Injury Abdomen in a Tertiary Care Hospital

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Abstract

Introduction: Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. Motor vehicle accidents and urban violence, respectively, are the leading causes of blunt and penetrating trauma to this area of the body.

Aim: The aim of the study is to evaluate the incidence of blunt injury abdomen, clinical presentation, morbidity, and mortality.

Materials and Methods: This prospective clinical study was carried out on patients admitted in Sivagangai Medical College Hospital. After admission, data for the study were collected by detailed history, thorough clinical examination, and relevant diagnostic investigations performed over the patient.

Results: In our study, road traffic accidents (RTA) were the most common cause of blunt abdominal trauma (68%) with 84% patients being were males. Diagnostic aspiration being an accurate investigation with 85% sensitivity. X-ray erect abdomen and ultrasound of the abdomen were the most sensitive investigation for hollow viscous injury and solid organ injuries, respectively, with spleen being the most common organ involved in the latter group. The most common cause of death was septicemia.

Conclusion: RTAs form the most common mode of injury; hence, measures should be taken to prevent these accidents and care of the victims at the accident site. A thorough and repeated clinical examination and appropriate diagnostic investigations lead to successful treatment in these patients.

Key words: Blunt injury abdomen, Mortality, Road traffic accidents

INTRODUCTION

Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. Blunt injury to the abdomen can also occur as a result of fall from height, assault with blunt objects, sports injuries, and bomb blasts. Unnecessary deaths and complications can be minimized by improved resuscitation, evaluation, and treatment. Rapid resuscitation is necessary to save the unstable but salvageable patient with abdominal trauma. Accurate diagnosis and avoidance of needless surgery is an important goal of evaluation. Motor vehicle accidents account for 75% of cases of blunt abdominal trauma. Explosive increase in population, high-speed vehicles, decivilization of human race, terrorism, and sports are just a few of the predisposing factors of trauma. Unrecognized intra-abdominal injury remains distressingly frequent cause for preventable death in a patient with blunt injury abdomen. Evaluation of a patient with abdominal trauma can be a most challenging task that a surgeon may be called upon to deal with. Investigative modality can only supplement the clinical evaluation and cannot replace it in the diagnosis of blunt abdominal trauma. In view of increasing number of vehicles and consequently road traffic accidents (RTAs), this dissertation has been chosen to study the cases of blunt abdominal trauma.

Aim

The aim of the study is to evaluate the incidence of blunt injury abdomen, clinical presentation, morbidity, and mortality.
MATERIALS AND METHODS

This prospective clinical study was carried out on patients admitted at Department of Surgery in Sivagangai Medical College Hospital. Patient admitted with a history of blunt abdominal trauma, undergoing surgical intervention, or treated by non-operative management were included in the study. Patients with penetrating injuries and gunshot injuries were excluded from the study. After admission, data for our study were collected by direct interview with the patient or patient relatives accompanying the patient and obtaining a detailed history. Clinical findings and relevant diagnostic investigations performed over the patient. After initial resuscitation of the patients, thorough assessments for injuries were carried out in all the patients. Documentation of patients, which included, identification, history, clinical findings, diagnostic test, operative findings, operative procedures, and complications during the stay in the hospital and during subsequent follow-up period, were all recorded on a pro forma specially prepared. Demographic data collected included the age, sex, occupation, and nature and time of accident leading to the injury. After initial resuscitation and hemodynamic stability, all patients were subjected to careful examination, depending on the clinical findings; decision was taken for further investigations such as four-quadrant aspiration, diagnostic peritoneal lavage, X-ray abdomen, and focused assessment with sonography for trauma.3,6,7,8 The decision for operative or non-operative management depended on the outcome of the clinical examination, hemodynamic stability, and contrast-enhanced computed tomography abdomen. Patients selected for non-operative or conservative management were placed on strict bed rest and were subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate and repeated examination of abdomen and other systems. Appropriate diagnostic tests, especially ultrasound of abdomen were repeated as and when required. In those who are operated, the operative findings and methods of management are recorded. Cases are followed up till their discharge from the hospital. If patient expired, postmortem findings are noted. Post-operative morbidity and duration of hospital stay were recorded. The above facts are recorded in a pro forma prepared for this study.

RESULTS

The total number of patients who has sustained blunt injuries to abdominal organs was 100. In the present study, maximum of cases were in the 21-30 age group (32%) followed by 11-20 group (22%), mean age was 39 years, range from 15 to 72 years. 84 (84%) patients were male and 22 (22%) were female. Male to female ratio was 4:1. Common cause of blunt trauma to abdomen was RTA, i.e., 68 (68%) and the second common cause was fall from height (22%). Other causes were hit by blunt objects and assaults (Figure 1).

The most common symptom was pain abdomen (94%). Next symptom was vomiting (30%) followed by distention (16%), urinary retention (8%), and Hematuria (4%) (Figure 2).

Ultrasound abdomen was done in 92 cases. X-ray erect abdomen was done in 90 cases. Four-quadrant aspirations were done in 80 cases (Figure 3).

Spleen was the most common organ involved in 32 (32%) cases and liver was the second most common organ injured in 16 (16%) cases. Small bowel was injured in 14% of cases. Large bowel, mesentery, and stomach were injured in 4% of cases.

Out of 100 cases, 58 (58%) were managed surgically and 42 (42%) were managed conservatively (Figures 4 and 5).

Post-operative complication was present in 20 cases; the most common complication after surgery was wound

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Figure 1: Distribution of mode of injury

Figure 2: Distribution of clinical symptoms
infection. It was seen in 10 cases (53%). Pelvic abscess developed in four cases (21%). 2 patients (11%) developed pneumonia. Anastomotic leak, intestinal obstruction, wound dehiscence, and abdominal comp. syndrome developed in one case each (5%). In this study, septicemia was the most common cause of death (5 cases). Three died of ARDS and another two died of sudden cardiac arrest (Figure 6).

**DISCUSSION**

The most common cause of blunt injury abdomen is RTAs (68%) which are comparable to most other studies. Mohapatra *et al.* also reported 62% cases of blunt injury abdomen were due to RTA. Another study by Curie *et al.* also reported 58.6% cases of blunt injury to abdomen were due to RTAs. In our study, the maximum number of cases was in the third decade of life (20-30). Most of the cases were in the first four decades of life. This indicates trauma is more common in young people. Range was from 15 to 72 years. Average age was 39 years. Our study is comparable to study by Curie *et al.* which showed maximum number of cases in the third decade (35%). Ranging from 15-72 years with a mean age of 39 years. Similar observations were also made by Allen *et al.* which showed 28% cases between 20 and 29 years of age. In the present study, 84 (84%) were males and 18 (18%) were females. In our study, male-to-female ratio was 4:1. Male-to-female ratio was same compared to other studies such as Tripathi *et al.* reported a ratio of 4.4:1. The most common symptom was pain abdomen (94%). Vomiting was the second most common symptom (30%), followed by distention of abdomen (16%), urinary retention (8%), and Hematuria. Another study by Tripathi *et al.* also reported pain abdomen in 91% of their patients. Diagnostic aspiration was done in 74 patients and positive in 52 cases. Out of these 52 cases, 36 cases have undergone laparotomy and the results were found to be positive. True negative in four cases, false negative in six cases, and not even one false positive. Sensitivity was 85% and specificity was 100% in our study. This is comparable to another study (Mohapatra *et al.*) which showed diagnostic aspiration to be accurate in 95% cases. Another study by Narsing *et al.* showed diagnostic aspiration to be 100% accurate. In our study, X-ray erect abdomen was done in 88 cases. It detected 16 cases of hollow viscus perforation with an accuracy of 100%. Rest of the cases had gangrenous bowel. X-ray erect abdomen was not done in two cases.
was gastric tear in two cases. Another study (Mohapatra et al.) reported accuracy of X-ray erect abdomen to be 100% in detecting hollow viscous injuries. In our study, ultrasonography (USG) abdomen was done in 92 cases out of 100 cases. 26 cases were found to have solid organ injuries on laparotomy. Out of these 26 cases, USG was not done in two cases preoperatively. In our study, USG was 81% sensitive in detecting solid organ injuries with the specificity of 100%. This is comparable to other studies such as Soffer et al. (2006) which showed USG to have 89% accuracy, 77% sensitivity, and 97% specificity. However, it was not very helpful in detecting hollow viscous injuries. In our study, spleen was the most common organ (32) injured was not very helpful in detecting hollow viscous injuries. In our study, spleen was the most common organ (32) injured in 32% of cases. Of these 32 cases, 18 were managed conservatively and 14 were operated. Splenectomy was done in 12 cases; our study is comparable to study done by Davis et al. which reported 24.7% of cases had splenic injuries, out of which 10.7% were operated and 14% were managed conservatively. All the operated cases underwent splenorrhaphy. Another study by Curie et al. reported 27.5% of cases had splenic injuries, out of which 15% were operated and splenorrhaphy was done in all cases.10 Liver is the next most commonly involved solid organ in 16 cases, Of which 10 were operated and 6 managed conservatively. Out of 10 cases that were operated, the laceration in the liver was sutured in two cases and gelatin sponge applied to prevent further bleeding in four cases. In other 4 cases, bleeding was already stopped and hemoperitoneum was drained. This is comparable to study by Davis et al.4 which showed 16.47% of liver injuries, of which 14% underwent laparotomy and suturing was done in all cases. Another study by Curie et al. showed 20.6% of liver injuries.3 A study by Rutledge et al. found spleen to be most commonly injured organ than liver.14 Small bowel was third most commonly injured organ, i.e., 14 (14%) in our study. Duodenum was injured in four cases. In all the four cases, a small perforation was present, so a simple repair with omental patch was done. Jejunum was injured in eight cases. In two cases, resection anastomosis was done, and in rest six cases, simple closure was done. Ileum was injured in four cases. In all the cases, simple closure was done. All cases of small bowel injury were operated, of which about six patients expired indicating 40% mortality. In our study, injury to small intestine was less compared to a study done by Allen et al.11 which showed 35.3% cases. Out of 100 cases in our study, 44 (44%) were managed surgically and 56 (56%) were managed conservatively. Our reports are comparable to Mohapatra et al.3 who reported 39% laparotomy rates in their series. Non-operative management consisted of nasogastric aspiration, urine output measurement, I.V fluids, analgesics, and antibiotics. In our study, a total of 46 cases were found to be having solid organ injury, of which 24 (52%) were managed conservatively and 22 cases (48%) were managed surgically. All patients in non-operative group recovered uneventfully. There were two mortalities in operative group. Our study shows that 52% of solid organ injuries can be managed nonoperatively. A study by Rutledge et al.14 also showed that incidence of non-operative management in 48% of both hepatic and splenic injuries. Wound infection was the most common complication in 10 (17.24%) cases after undergoing surgery followed by pelvic abscess in four (6.89%) cases, followed by two cases (3.44%) of pneumonia, anastomotic leakage, and intestinal obstruction each. This is comparable to a study by Jolly et al.15 which showed wound infection in 14% of the cases. Another study by Davis et al. showed wound infection as a complication in 15% of the cases.6 Among 100 cases, 10 (10%) cases ended in mortality and septicemia was the most common cause of death (5 cases). Sudden cardiac arrest was cause of death in two cases and ARDS was cause of death in three cases. These results are comparable to another study by Jolly et al.15 which showed 10% mortality in their study with septicemic shock the most common cause of death. Another study by Davis et al.6 showed 15% mortality with septicemia the most common cause of death.

CONCLUSION

Blunt trauma to abdomen is on rise due to excessive use of motor vehicles. It poses a therapeutic and diagnostic dilemma for the attending surgeon due to wide range of clinical manifestations ranging from no early physical findings to progression to shock. Hence, the trauma surgeon should rely on his physical findings in association with the use of modalities such as X-ray abdomen, USG abdomen, and abdominal paracentesis. Hollow viscous perforations are relatively easy to pick on X-ray. However, solid organ injuries are sometimes difficult to diagnose due to restricted use of modern amenities such as CT scan in India. From our study, we conclude that in hemodynamically stable patients with solid organ injury, conservative management can be tried and non-operative management is associated with less complication and morbidity.

REFERENCES

Amuthan, et al.: Clinical Study on Blunt Injury Abdomen


Source of Support: Nil, Conflict of Interest: None declared.
Prevalence and Predictors of Renal Artery Stenosis in Patients with Type 2 Diabetes and Coronary Artery Disease Undergoing Coronary Angiography

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²Associate Professor, Department of Cardiology, Government Rajaji Hospital and Madurai Medical College, Madurai, Tamil Nadu, India,
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Abstract

Background: Atherosclerotic renal artery stenosis (RAS) is a major comorbid and independent risk factor for cardiovascular diseases. The presence of diabetes mellitus (DM) an independent predictive factor for RAS has been controversial. Many studies evaluated the risk of RAS in patients with DM as a subgroup analysis rather than a study population. We evaluated the prevalence of RAS specifically in patients with Type 2 DM and coronary artery disease (CAD).

Methods: The diabetic patients with CAD undergoing coronary angiography (CAG) and renal angiography were planned after completion of the CAG. The renal arteries were selectively cannulated with Judkins right catheter, and renal angiogram was completed. In difficult cases, nonselective renal angiogram was done using pigtail catheter. Significant RAS was defined as decrease of at least 50% in luminal diameter.

Results: A total of 50 patients with angiographically proven CAD were studied. There were 30 men (60%) and 20 women (40%) with a mean age of 54.4 years (range 36-75). Patients had segment elevation myocardial infarction (STEMI) (n = 15), unstable angina/non-STEMI (n = 20). 0.12 (24%) patients were smokers. 24 (48%) patients had hypertension, 20 (40%) patients had hyperlipidemia and 7 (14%) patients were receiving insulin treatment. Among 50 patients, 8 (16%) had a significant RAS, of which one had bilateral involvement. The prevalence of RAS was 2%, 4%, and 10% for single vessel disease, 2 vessel disease, left main coronary artery, and triple vessel disease, respectively. RAS was more prevalent in age >60, females, patients with coexistent hypertension (HT).

Conclusion: We, therefore, find that screening of RAS should be a part in diabetic patients with multivessel disease and coexistent HT. It is necessary to detect atherosclerotic RAS to save renal function, prevent complication by timely intervention limitation.

Key words: Coronary artery disease, Diabetes mellitus, Renal artery stenosis

INTRODUCTION

Atherosclerotic renovascular disease is a frequently overlooked and potentially correctable disease. Unsuspected renal artery stenosis (RAS) of varying severity coexists with coronary artery disease (CAD) patients. It is increasingly recognized that atherosclerotic RAS is an important cause of renal insufficiency, refractory hypertension (HT), and cardiac destabilization syndromes (unstable angina and flash pulmonary edema). The prevalence of RAS ranges from 3–30% in patients undergoing coronary angiography (CAG) for suspected CAD. RAS coexists with CAD of varying severity. There is a linear correlation between RAS and severity of CAD. It independently predicts mortality in CAD patients undergoing CAG. The increased mortality is mainly attributed by cardiovascular diseases. The coexistence of diabetes mellitus (DM), HT, CAD, and RAS forms a deadly combination.
MATERIALS AND METHODS

This is a observational, analytical study. This study was done with the aim of screening RAS in patients with DM with CAD who are admitted for CAG and predicting risk factors association with atherosclerotic RAS.

Study Population
This study was conducted among 50 diabetic patients with CAD admitted for coronary angiogram. Informed and written consent were obtained from each patient before being included in the study.

Inclusion criteria
The inclusion criteria were patients admitted with a history of diabetes with CAD, planned for CAG.

Exclusion criteria
1. Does not opt for inclusion in the study
2. Pregnancy
3. Age <30 years
4. Chronic renal insufficiency GFR <60 ml/min/m²
5. Patients with EF <30%
6. History of contrast allergy.

Data Collection and Methods
Clinical analysis includes the presence of signs of HT, CAD, and RAS. Laboratory profile includes blood counts, urea, creatinine, lipid profile, echocardiogram, for all patients, treatment details to be collected including drugs for HT, DM, CAD.

Outcome includes identify patients with high-risk clinical predictors and the prevalence of significant RAS thereby recommend screening in that subgroup and planned revascularization

Procedure
The diabetic patients with CAD undergoing CAG and renal angiography were planned after completion of the CAG. The renal arteries were selectively cannulated with judkins right catheter, and renal angiogram was completed. In difficult cases, non-selective renal angiogram was done using pig tail catheter. A significant RAS was defined as decrease of at least 50% in luminal diameter.

Statistical Analysis
The information collected regarding all the selected cases were recorded in a master chart. Data analysis was done using SPSS software Sigma stat 3.5 version (2012). Using this software, range, frequencies, percentage, mean, standard deviation, and P value were calculated through one-way ANOVA, Chi-square, Pearson, and Spearman correlation test and P < 0.05 was taken statistically significant.

RESULTS

A total of 50 patients with angiographically proven CAD were studied. There were 30 men (60%) and 20 women (40%) with a mean age of 54.4 years (range 36-75). Patients had segment elevation myocardial infarction (STEMI) (n = 15), unstable angina/non-STEMI (UA/NSTEMI) (n = 15), CSA (n = 20), 12 (24%) patients were smokers, 24 (48%) patients had HT, 20 (40%) patients had hyperlipidemia and 7 (14%) patients were receiving insulin treatment.

Among 50 patients, 8 (16%) had a significant RAS of which one had bilateral involvement. The prevalence of RAS was 2%, 4%, 10% for single vessel disease (SVD), 2 vessel disease (2VD), left main coronary artery (LMCA), and triple vessel disease (TVD), respectively. RAS was more prevalent in age >60, females, patients with coexistent HT.

DISCUSSION

RAS is a major comorbid and independent risk factor for cardiovascular disease. The western data show a prevalence of 13.5-18% in patients undergoing CAG for suspected CAD.1 Less data are available from the Indian subcontinent.

The prevalence of RAS in our study conducted in 50 patients is 16%.2-5 Mean age is 54.4 years (Table 1). Most of the patients are females. STEMI is the most common clinical presentation (Table 2). The conventional risk factors such as smoking and dyslipidemia did not find a significant association. The coexistent of HT increases the probability of RAS in the study group. In the subgroup analysis of our study, the prevalence of RAS was 2%, 4%, and 10% for SVD, 2VD, LMCA, and TVD, respectively (Table 3).6 We, therefore, find that screening for RAS should be a part in TVD population. This study

<table>
<thead>
<tr>
<th>Table 1: Age distribution</th>
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<tbody>
<tr>
<td>Age in years</td>
</tr>
<tr>
<td>&lt;40 years</td>
</tr>
<tr>
<td>41-55</td>
</tr>
<tr>
<td>56-70</td>
</tr>
<tr>
<td>&gt;70</td>
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</table>

RAS: Renal artery stenosis

<table>
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<tr>
<th>Table 2: CAD versus RAS</th>
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<tbody>
<tr>
<td>CAD</td>
</tr>
<tr>
<td>CSA</td>
</tr>
<tr>
<td>UA/NSTEMI</td>
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<tr>
<td>STEMI</td>
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RAS: Renal artery stenosis, CAD: Coronary artery disease, UA/NSTEMI: Unstable angina non-segment elevation myocardial infarction
made us to screen RAS in a subset of patients such that unnecessary renal angiogram could be avoided in vast majority patients. Although RAS can be present in non-diabetes and normal coronary patients, the number is too low. Hence, we excluded this population from our study. We have also excluded PAD in our study as to reduce access site complications. Our study found age >60 years, female sex, coexistent HT, and multivessel disease as predictors of RAS.7-10

The luminal diameter of significant RAS was ≥50% in our study. The relatively high prevalence in our population may be less stringent criteria.

The presence of diabetes as an independent predictor of RAS has been controversial, but many of these studies evaluated the risk of RAS in patients with DM as a subgroup analysis rather than a study population.

Our study evaluates the prevalence of RAS specifically in adults with type 2 diabetes.

**Limitations of the Study**

The study population was small and it is a single-center cross-sectional observational study.

Functional assessment of RAS was not done. IVUS and FFR are not in our investigation strategy.

There is a strong correlation of RAS and peripheral artery disease but peripheral angiogram was not part of our study.

Overestimation of lesion severity was done because it is only a luminogram and orthogonal assessment is not done.

**CONCLUSION**

We, therefore, find that screening of RAS should be a part in diabetic patients with multivessel disease and coexistent HT. It is necessary to detect atherosclerotic RAS to save renal function and prevent complication by timely intervention.

**REFERENCES**

INTRODUCTION

Hippocampal sclerosis (HS) is the most recurrent pathologic condition underlying intractable temporal lobe epilepsy (TLE). Epilepsy is a known neurological disease specified by repeated seizures. Even though epilepsy is well manageable with antiepileptic drugs, there still exist about 30% of epilepsy patients who are not responding to optimal treatment. The majority of the patients have better results after surgery, and this constantly determined by the presurgical assessment by electroencephalography and magnetic resonance imaging (MRI) (Figure 1).1

Mesial temporal sclerosis (MTS) is a specific pattern of hippocampal neuronal loss accompanied by gliosis and atrophy. The etiology is unknown, but there is a relationship between MTS and prolonged febrile seizures earlier in life, complicated delivery and developmental processes. In 15% of patients another developmental abnormality can be found, mostly focal cortical dysplasia. This is called dual pathology. MTS is the most common cause of partial complex epilepsy in adults and is also the most common etiology in young adult patients undergoing surgery. Surgical removal of visible MRI changes associated with unilateral MTS leads to seizure freedom in up to 80% of cases (Figure 2).2-5

Unilateral HS is the most recurrent pathological condition in TLE, and up to 65% of cases of TLE can be assigned...
to pathology arising entirely in the hippocampus. Visual (qualitative) assessment of T2-weighted changes (hyperintense signal on T2-weighted images and atrophy) was the advance method that described an interlink among hippocampal pathology and MR-detectable signal abnormality. Hippocampal volume loss is a delicate and important pointer of HS in the clinical setting of epilepsy, and hippocampal volumetric study can quantify atrophy in TLE patients. T2 relaxometry is another quantiative technique to describe the frequency and severity of T2 abnormality. Hippocampal T2 relaxation time increases in patient of HS. The main goal of this study is to assess and differentiate the comparative value of visual evaluation, hippocampal volumetry, and T2 relaxometry independently and in composition, in the identification of HS. An important issue is whether these techniques give complementary or redundant information about the hippocampus. We also focus to provide normative MR Hippocampal volumetric data in Indian population as well as to initiate a multimodal MR imaging protocol.

The table also summarizes epileptogenic lesions that are detected in patients with uncontrollable seizures. Mesial temporal sclerosis is the most common cause of intractable epilepsy. In medication refractory epilepsy, the most common location of the epileptogenic lesion is temporal lobe (60%), frontal lobe (20%) and parietal lobe (10%), periventricular (5%), and occipital (5%).
T2 Relaxation Time Measurement

T2 relaxation times were measured using 16-echo sequence which is a multiple spin-echo sequence (TE: 22-352, TR: 3000, slice thickness: 5 mm, FOV: 230). 16 separate spin-echo images were obtained for each oblique coronal slice at echo times ranging from 22 to 352 ms. The T2 maps were acquired using a computer program that made a single exponential to the signal intensity data from equivalent pixels from all 16 echoes. The T2 relaxation time was then calculated for each pixel, and an image was constructed in which pixel intensity corresponded to the calculated T2 relaxation time. The mean hippocampal T2 relaxation time was calculated by manually marking a region of interest in the largest possible circular area within the anterior, middle, and posterior sections corresponding to the three sections of the hippocampus designated as hippocampal head, hippocampal body, and hippocampal tail, respectively, while evading boundaries where partial volume effects with cerebral spinal fluid might arise.

Normal control values for T2 relaxation time were acquired from control subjects using an identical protocol. Abnormal T2 values were considered when these were both outside the range of all normal control values and more than two standard deviations outside the mean value of control hippocampal T2 relaxation times.6,7

MATERIALS AND METHODS

MRI images of 50 patients with the age group of 18-65 years from January 2016 to May 2016 retrospective analysis with clinical suspicion of HS and with the history of epilepsy from Chettinad Hospital and Research Institute were included in the study. An informed consent will be obtained from the participating subjects. The patients referred to MRI brain were imaged in GE Signa 1.5 HDxt scanner with the routine brain protocol with an add up sequence of T2 multi-echo sequence with 16 echoes for the evaluation of the HS. The images obtained were subjected to radiological analysis and interpretation.

Sample Selection

Inclusion criteria
- Patients who have epilepsy,
- Patients with the history epilepsy and other neurological disorders.

Exclusion criteria
- Patients with any H/O metallic implants,
- Patients with known cardiac pacemaker,
- Pregnant women,
- Claustrophobic patients.

Image Acquisition and Image Processing

All our patients were imaged on 1.5 Tesla GE Signa HDxt scanner. An eight channel NVcoil was used. The data obtained were examined by the two radiologists independently for qualitative analysis.

RESULTS

We had included 50 patients for this research after getting informed consent. Out of 50 patients, T2 multi-echo sequence identified hippocampal defects in 12-14 patients. Hence, routine sequences of the brain in MRI with an add up sequence of T2 multi-echo sequence is better for detection of major hippocampal defects in brain. A patient of age 29-year-old male came with the complaints of seizures, and the patient was referred for the MRI brain. First, the patient was screened with the routine sequences of MRI brain and then the additional sequence T2 multi-echo sequence was added.
DISCUSSION

Coronal T2-weighted (T2W) and fluid attenuated inversion recovery (FLAIR) images are the most sensitive for detecting MTS. On axial slices MTS is commonly overlooked. Bilateral MTS is difficult to detect due to the lack of comparison with the unaffected contralateral hippocampus. Notice the volume loss, which indicates atrophy and causes secondary enlargement of the temporal horn of the lateral ventricle. The high signal in the hippocampus reflects gliosis.

Mesial temporal sclerosis may occur in association with other pathology, especially focal cortical dysplasia. This is called dual pathology (Figure 4).

The images show MTS with a hyperintense and shrunken hippocampus (Red arrows), and secondary enlargement of the left temporal horn of the left laterale ventricle (Figure 5).

Also notice associated subcortical hyperintensity in the left temporal lobe indicating focal cortical dysplasia.

A 35-year-old patient with refractory TLE was included in the study. MR shows subtle hyperintensity of the left hippocampus on the axial FLAIR (Blue arrow) and atrophy of the left hippocampus on coronal images (Yellow arrow) (Figure 6).

Hippocampus hyperintensity on T2W imaging or FLAIR images with volume loss is diagnostic for MTS in the appropriate clinical setting (Figure 7).

CONCLUSION

Calculation of regional abnormalities of hippocampal T2 relaxation along the length of the hippocampus gives the advance improvement to the MRI assessment of the hippocampi in patients with TLE and is corresponding to the volumetric and morphological data.

REFERENCES

4. Plimer DL. Dispmac: A display and analysis tool for medical images. Rev
6. Rocca WA, Sharbrough FW, Hauser WA, Annegers JF, Schoenberg BS.
Magnetic Resonance Imaging Versus Sinogram in Evaluation of Perianal Sinus

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Abstract

Introduction: Perianal fistula is a commonly encountered disease, complete evaluation of which is essential to prevent recurrent surgery.

Aim: The purpose of this study was to determine the role of magnetic resonance imaging (MRI) and sinogram in evaluation of perianal sinus and comparison between two investigations in pre-operative assessment of perianal fistulas.

Materials and Methods: A prospective study was carried on 34 patients studied between the period of May 2015 and August 2016. Patients who had undergone X-ray sinogram followed by MRI non-contrast study were included in the present study. MRI sequences assessed including T2 weighted (T2W) sagittal, axial and coronal, short T1 inversion recovery (STIR) coronal and axial, T1W axial, and coronal sequences.

Results: On MRI evaluation, out of 34 patients, 9 patients (26.5%) had only perianal sinus with no communication with the anal canal while 25 patients (73.5%) were diagnosed as perianal fistula. Out of these 34 patients, 5 were female and 29 were male patients. Of the 25 patients with fistula, 24 patients had fistulous communication with anal canal, and 1 patient had extrasphincteric fistula (Type 5 St. James University and Hospital and Type 4 Parks classification) tracking down from a pelvic abscess. Of these 25 fistula cases, 14 (56%) were simple and 11 (44%) cases were associated with branching course. On conventional sinogram out of 34 subjects, 20 cases were diagnosed as sinus and 14 were diagnosed as fistula and out of 20 cases of sinus tracts 11 cases were turned out to be fistula by MRI. Hence, out of 25 fistulas, only 56% (14 patients) of fistulas were picked up correctly. 44% (11 patients) of fistulas were falsely interpreted as sinus tracts.

Conclusion: In our study, MRI proved to be a better investigation in the evaluation of perianal fistula in comparison to X-ray sinogram. T2W and STIR sequence have major role in determining detail anatomy of sinus track. Accurate pre-operative assessment of perianal fistula may help in reducing the recurrence and thereby reducing the number of repeated surgery.

Key words: Magnetic resonance imaging, Perianal fistula, Sinogram

INTRODUCTION

Perianal fistula is a commonly encountered disease infamous for its recurrence because of associated concealed infection.¹ The treatment of fistulas requires surgery.

While this is successful in most cases, it is associated with a significant prevalence of recurrence.² Successful surgical management of anal fistulas requires accurate pre-operative assessment of the course of the primary fistulous track and the site of any secondary extension or abscesses.³ A detailed assessment of the anatomic relationship between the fistula and the anal sphincter complex allows surgeons to choose the best surgical treatment, thus significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence.⁴,⁵ Before the era of magnetic resonance imaging (MRI), sinogram was the choice of radiological investigation to evaluate the extension and communication to visceral structures. In
third world, country like India due to unavailability of MRI, surgeon still rely on sinogram. MRI, due to its high soft-tissue contrast resolution and multiplanar imaging helps in accurate assessment of associated abscesses, horseshoe, and secondary tracts, alerting the surgeon about the complex nature of the disease and providing an excellent road map before surgery. Depending on the location and course of the primary tract, perianal fistulae have been classified into four types by Parks et al. (1) Intersphincteric (incidence 60-70%). The infection starts from an anal gland and develops in the inter-sphincteric plane, lying between the internal and external sphincters, without penetrating the external sphincter. It eventually ruptures onto the skin, thereby creating the fistula. (2) Transsphincteric (incidence 20-30%). This occurs when the intersphincteric infection penetrates the external sphincter to reach the ischioanal fossa and, eventually, the perianal skin. (3) Suprasphincteric (uncommon): These fistulae extend superiorly in the intersphincteric plane to reach above the levator plane and then penetrate inferiorly through the ischioanal fossa. (4) Extrasphincteric (uncommon): These result from extension of primary pelvic disease (e.g., Crohn's disease, diverticulitis, and radiation proctitis) down through the levator plate.

Morris et al. using MRI characteristics classified fistula-in-ano into five grades. This classification system is known as St. James University and Hospital (SJUH) classification (Figure 1). Grade 1: A simple linear intersphincteric fistula without involvement of the ischioanal or ischiorectal fossa. The tract is confined by the external sphincter and has no extensions. Grade 2: An intersphincteric fistula with an abscess or secondary tract, but bounded by the external sphincter. These secondary tracts may be of the horseshoe variety crossing the midline or may extend up the intersphincteric plane without crossing the midline. Grade 3: A transsphincteric fistula crossing both the internal and external sphincters and the ischiorectal fossa before opening onto the skin. Grade 4: A transsphincteric fistula with an associated abscess in the ischioanal or ischiorectal fossa. Grade 5: Perianal fistulous disease extending above the levator ani muscle. This includes extrasphincteric fistula and supra-sphincteric fistula, which originates in the inter-sphincteric space before piercing the levator-ani and traveling downward in the ischiorectal fossa.

In the present study, our aim is to emphasize the benefits and limitations of sinogram and MRI study by correlating the findings of both studies.

**MATERIALS AND METHODS**

The study population comprised 34 patients. These patients were studied prospectively from a period of 16 months (between May 2015 and August 2016). Every patient who had a complaint of perianal discharging sinus had undergone X-ray sinogram followed by MRI non-contrast study carried out on a 3-T MRI system with body coil was included in the study. Equipment used were Magnetom Skyra, Siemens (3T field strength) MRI machine, and siemens optilix 154/30/5OR-101S X-ray machine. The sequences assessed were: Sagittal T2 TSE (TR/TE 3500/86, FOV 200 x 200, matrix 400 x 400, Nex 2, slice...
thickness 3 mm); Axial T2 TSE (TR/TE 4000/86, FOV 200 × 200, matrix 400 × 400, Nex 2, slice thickness 3 mm); Coronal T2 TSE (TR/TE 3500/86, FOV 200 × 200, matrix 400 × 400, Nex 2, slice thickness 3 mm); Coronal short T1 inversion recovery (STIR) TSE (TR/TE 3200/64, FOV 340 × 340, matrix 309 × 309, Nex 2, slice thickness 4 mm); Axial STIR TSE (TR/TE 5150/38, FOV 200 × 200, matrix 333 × 333, Nex 2, slice thickness 3 mm); Axial T1 TSE (TR/TE 550/12, FOV 200 × 200, matrix 333 × 333, Nex 2, slice thickness 3 mm); Coronal T1 TSE (TR/TE 570/12, FOV 200 × 200, matrix 250 × 250, Nex 2, slice thickness 3 mm); The external opening was localized with the primary tract and its course in relation to the anal sphincter. Internal opening in the anal canal if any was noted. The presence of hidden areas of sepsis, any abscess or fluid collection, secondary ramifications, horseshoe branches were noted for every case. The fistulas were classified according to the SJUH and Park’s classification.

RESULTS

In the present study, highest incidence of disease occurred in age group of 41-50 years followed by age group of 31-40 years (Bar Graph 1). Majority diseased patients were male with a male to female ratio of 5.8:1. On conventional sinogram, out of 34 patients, 14 patients had fistulous communication with the hollow viscer, and 20 patients had sinus tracts. Of the 14 fistulas, 3 were branching, and 11 were simple. Out of 20 sinuses, 3 were branching, and 17 were simple sinus tracts. On MRI evaluation, out of 34 patients, 9 patients (26.5%) had only perianal sinus with no communication with the anal canal while 25 patients (73.5%) were diagnosed as fistulas. Of these 25 patients, 24 patients had fistulous communication with anal canal, and 1 patient had extrasphincteric fistula (Type 5 SJUH and Type 4 Parks classification) tracking down from a pelvic abscess. Out of 25 fistulas, 11 (44%) were associated with secondary branches, and 14 (56%) were simple non-branching fistulas. Out of 25 fistulas, 10 (40%) were associated with abscess formation, and 3 (12%) were associated with horseshoe branching. According to SJUH classification we found 25 cases of anorectal fistulas, out of which there were 9 in numbers of type-1, 6 in numbers of type-2, 2 in numbers of type-3, 5 in numbers of type-4 and 3 in numbers of type-5 (Table 1).

Thus, on conventional sinogram out of 25 fistulas (as diagnosed by MRI) only 56% (14 patients) of fistulas were picked up correctly. 44% (11 patients) of fistulas were falsely interpreted as sinus tracts.

DISCUSSION

We studied 34 patients with a history of perianal pain and discharging sinus. The patients were investigated with conventional X-ray sonogram and MRI perineum (non-contrast). Our study was limited to following sequences in MRI-T1 coronal and axial, STIR coronal and axial, T2 coronal, axial, and sagittal. Each sequence has its own importance in contributing to the final description of fistula. In the present study, the highest incidence of disease occurred in the age group of 41-50 years followed by age group of 31-40 years. Majority diseased patients were male with a male to female ratio of 5.8:1. Similar incidences are found by Barker et al. in their study.12

Similar to Darwish et al.,13 we, in our study, found that the levatorani muscle, ischioanal, and ischiorectal fossae were better appreciated on T1 weighted (T1W) sequences giving a gross anatomical orientation of the perianal infective pathology as depicted in Figure 2. Active disease was picked up on T2W images as the sinus tract and fistulous communication filled with fluid appear hyperintense on this sequence (Figure 3). The distance from anal verge was estimated on T2W sagittal sequence (Figure 4).

Bar Graph 1: Age-wise distribution of disease

Figure 2: The levatorani muscle (white arrow), ischioanal and ischiorectal fossae (red arrow) are better appreciated on coronal T1-weighted sequences as shown in this image
In the present study, we found that STIR sequence by suppressing the background fat signal was most beneficial in easily locating the hidden areas of sepsis and secondary ramification of the primary tract (Figure 5). However, in a prospective study of 42 patients by Halligan and Bartram, STIR imaging failed to demonstrate secondary tracts and did not reveal small residual perianal abscess from perianal inflammation, making it less suitable for demonstration of fluid collections or extensions than are T1W post contrast study.14 However, we did not use contrast-enhanced sequences in the present study. The combination of T1, T2, and STIR sequences was found sufficient in delineating the perianal disease and classifying the fistulas.

The multiplanar T2 sequence also helps in locating the fistula in relation to the sphincter complex. In the present study, we found that in all the positive cases of perianal fistulas, use of non-contrast MRI, and combination of above sequences with multiplanar imaging produced most of the details necessary for pre-operative evaluation and accurate localization of perianal fistula. The levator plate was best seen on coronal plane while the anal clock and internal opening were best seen on axial images. The disruption of external anal sphincter well distinguished a trans-sphincteric fistula from an inter-sphincteric fistula on T2W sequence. MRI has a major impact in the pre-operative assessment of perianal fistulas.15-17

As the sinus tract is directly examined by injecting the radio-opaque contrast in the tract sinogram was considered gold standard. Sinogram is used as initial screening investigation especially in developing countries like India where availability and cost of investigation affect the patient workup. In the present study, only 56% of fistulas were picked up correctly on conventional imaging, 44% of fistulas were falsely interpreted as sinus tracts as depicted in Bar Graph 2. The probable cause for this false interpretation is technical error due to improper seal at the sinus opening while injecting contrast leading to inadequate pressure thus leads to incomplete filling of the sinus tract with contrast leading to failure indelineating the primary tract and secondary branches in its entirety. Conventional imaging also did not help in understanding the relationship of these tracts with the sphincter complex. Thus, the need of MRI before surgery was obvious.

Other investigations that can be used in evaluating perianal fistula are endosonography and contrast-enhanced computed tomography (CT). Endosonography though has good resolution is penalized due to the limited field of view and is an uncomfortable study for the patient whereas contrast-enhanced CT has limited soft-tissue resolution.


However, there is no literature available to compare the result of X-ray sonogram and MRI pelvis in the evaluation of perianal sinus, we tried to compare the benefits and limitations of both investigations in following parameters:

<table>
<thead>
<tr>
<th>Conventional X-ray sinogram</th>
<th>MRI perineum</th>
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<tbody>
<tr>
<td>Less efficient in detecting fistulous communication</td>
<td>Detects the fistulous communication, secondary branches, and ramifications</td>
</tr>
<tr>
<td>No extra detail about relationship to sphincter so cannot predict post-surgical sphincter incontinence</td>
<td>Detailed anatomical orientation of perianal disease in relation to sphincter can be studied hence can predict chances of post-surgical sphincter incontinence</td>
</tr>
<tr>
<td>Supralevator extension cannot be commented upon accurately</td>
<td>Good in identifying the supralevator extension</td>
</tr>
<tr>
<td>No soft-tissue contrast available</td>
<td>Excellent soft-tissue contrast</td>
</tr>
<tr>
<td>Cannot be performed in chronic fibrosed sinuses</td>
<td>Can be performed</td>
</tr>
<tr>
<td>Painful and uncomfortable to patient</td>
<td>Use of surface coils makes it a comfortable investigation</td>
</tr>
<tr>
<td>Cheaper investigation and easily available</td>
<td>Relatively costly investigation</td>
</tr>
<tr>
<td>Initial screening investigation</td>
<td>Investigation of choice</td>
</tr>
</tbody>
</table>

**CONCLUSION**

In our study, MRI proved to be a better investigation in the evaluation of perianal fistula in comparison to X-ray sonogram. T2W and STIR sequence have major role in determining detail anatomy of sinus track. Accurate pre-operative assessment of perianal fistula may help in reducing the recurrence and thereby reducing the number of repeated surgery.

**REFERENCES**

Three-dimensional Echocardiography: A Novel Technique for Rheumatic Mitral Valve Stenosis Evaluation

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Abstract

Introduction: This study aimed to assess which echocardiographic method has the best agreement with the mitral valve area (MVA) invasively evaluated by the Gorlin’s formula and also to evaluate the feasibility and reproducibility of three-dimensional (3D) echocardiography for the estimation of MVA and Wilkins score in patients with rheumatic mitral stenosis (RHMS).

Materials and Methods: This study is a comparative study. This study was conducted to describe the various methods of MV assessment in patients with RHMS. We hypothesized that, since 3D echocardiography allows a different and superior evaluation of MV apparatus, this technique could increase the ability to perform an accurate MVA planimetry immediately after a percutaneous mitral commissurotomy (PTMC). The use of the new transthoracic 3D matrix array probe (Philips, IE33) allows online 3D rendering of cardiac structures, enabling a fast and accurate analysis of cardiac structures.

Results: Fifty consecutive patients with RHMS comprised our study group. There were 32 (64%) women, and the mean age was 32.5±10 years. The mean LA size was 4.83±0.93 cm. Mitral peak gradient was 25.7±6.1 mmHg and mitral mean gradient was 15.5±4.2 mmHg. Mitral stenosis was the predominant valve lesion in all of them, but concomitant mitral regurgitation grade I/II was present in four patients and aortic regurgitation grade II/III was present in two patients. Forty-two patients were in normal sinus rhythm and eight in atrial fibrillation.

Conclusion: Transthoracic 3D echocardiography is a feasible and accurate technique for measuring MVA in patients with RHMS in pre, intra, and post-PTMC states compared to the pressure half-time method, proximal isovelocity surface area and 2D echo planimetry.

Key words: Mitral valve area, Rheumatic mitral stenosis, Three-dimensional echocardiography

INTRODUCTION

Rheumatic mitral stenosis (RHMS) is characterized by restriction of blood flow from the left atrium to left ventricle as a result of a narrowed mitral passage. It is an acquired valve defect. The fundamental treatment for RHMS is to increase the mitral valve area (MVA) by means of percutaneous balloon valvuloplasty or by surgical valve replacement. To establish the time of surgery and an optimal management, it is essential to make appropriate and accurate assessment of its severity. At present, the invasive measurement of the MVA is based on the Gorlin’s formula. This method has been used as the invasive reference method to assess the severity of RHMS. However, it is an invasive method that may result in complications and inaccuracies. Recently, live three-dimensional (3D) echocardiography has become an available technique in many echocardiography laboratories, providing numerous advantages in the assessment of valvular disease. Our aim was to assess which echocardiographic method has the best agreement with the MVA invasively evaluated by the Gorlin’s formula and also to evaluate the feasibility and reproducibility of this technique.
reproducibility of 3D echocardiography for the estimation of MVA and Wilkins score in patients with RHMS.

MATERIALS AND METHODS

Study Design
This study is a comparative study. This study was conducted to describe the various methods of MV assessment in patients with RHMS.

Total Number of Patients
Totally fifty patients were included in this study.

Place of Study
This study was conducted in Government Rajaji Hospital, Madurai. Fifty consecutive patients who were attending cardiology outpatient department fulfilling the inclusion criteria were included in this study.

Inclusion Criteria
Patients with clinical features of RHMS were included in this study.

Exclusion Criteria
All patients with clinical features of rheumatic mitral regurgitation grade II and above were excluded from the study.

MATERIALS AND METHODS

MVA is to be determined by conventional echo-Doppler methods and by 3D with full volume (Philips IE 33 with matrix array transducer). We compare the echocardiographic findings with the invasive MV assessment (Gorlin's formula). Mitral score (Wilkin's score) has to be measured. In the last decade, multiple studies depicted discrepancies between MVA measurements obtained with the pressure half-time (PHT) method and invasive methods during the immediate post-percutaneous mitral commissurotomy (PTMC) period. Our aim was to assess the accuracy of live 3D echo to measure the MVA in the pre- and immediate post-PTMC period. The invasively determined MVA was used as the gold standard. We hypothesized that since 3D echocardiography allows a different and superior evaluation of MV apparatus, this technique could increase the ability to perform an accurate MVA planimetry immediately after a PTMC. The use of the new transthoracic 3D matrix array probe (Philips, IE33) allows online 3D rendering of cardiac structures, enabling a fast and accurate analysis of cardiac structures.

RESULTS

Fifty consecutive patients with rheumatic mitral stenosis comprised our study group. There were 32 (64%) women, with a mean age of 32.5±10 years (Table 1). The mean left atrial (LA) size was 4.83±0.93 cm. Mitral peak gradient was 25.7±6.1 mmHg and mitral mean gradient was 15.5±4.2 mmHg (Table 2). Mitral stenosis was the predominant valve lesion in all of them, but concomitant - mitral regurgitation grade I/II was present in four patients and aortic regurgitation grade II/III was present in two patients. Forty-two patients were in normal sinus rhythm and eight in atrial fibrillation.

Comparison of Noninvasive Methods with Invasive Methods
MVA determined by different methods was PHT: 0.86±0.23 cm²; 2D 0.85±0.23 cm²; Proximal isovelocity surface area (PISA) 0.68±0.13 cm²; Live 3D: 0.63±0.21 cm²; and Gorlin's method: 0.69±0.15 cm² (Table 3). Kruskal Wallis Chi-square-test was used to test the significance of difference between quantitative variables that showed a better agreement when comparing the invasively determined MVA with live 3D-determined MVA than when comparing the former with the 2D, PHT, and PISA determined MVA. Agreement between live 3D and 2D, PHT, and PISA was also evaluated, showing acceptable results. Agreement between live 3D and 2D PHT and PISA was also evaluated, showing acceptable results.

The time required to obtain and analyze the 3D images, evaluated in 50 consecutive patients, was 27±5 min. The best 3D echocardiography method to obtain adequate images for planimetry was the 3D full volume using zoom method in all patients. The view for 3D planimetry was the apical 3-chamber view.

Valve Score: Evaluation of valve score was different for 2D compared with 3D. The best 3D echocardiography method to obtain acceptable images for planimetry was the 3D full volume using zoom method in all patients. The view for 3D planimetry was the apical 3-chamber view.

Table 1: Age distribution

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>Cases n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20</td>
<td>10 (20)</td>
</tr>
<tr>
<td>21-30</td>
<td>11 (22)</td>
</tr>
<tr>
<td>31-40</td>
<td>18 (36)</td>
</tr>
<tr>
<td>41-50</td>
<td>9 (18)</td>
</tr>
<tr>
<td>Above 50</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Total</td>
<td>50 (100)</td>
</tr>
<tr>
<td>Range (years)</td>
<td>13-52</td>
</tr>
<tr>
<td>Mean±SD (years)</td>
<td>32.5±10</td>
</tr>
</tbody>
</table>

SD: Standard deviation

Table 2: Profile of case study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>32.5±10</td>
</tr>
<tr>
<td>Sex</td>
<td>Male−18 (36%)</td>
</tr>
<tr>
<td>LA (cm)</td>
<td>4.83±0.93</td>
</tr>
<tr>
<td>Mitral PG</td>
<td>25.7±6.1</td>
</tr>
<tr>
<td>Mitral MG</td>
<td>15.5±402</td>
</tr>
</tbody>
</table>

LA: Left atrial
Table 3: Pre-PTMC MVA as measured by various methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Pre-PTMC MVA</th>
<th>Difference from 3D-ECHO</th>
<th>Correlation with Gorlins</th>
<th>Regression coefficient 3D-ECHO</th>
<th>Gorlins</th>
</tr>
</thead>
<tbody>
<tr>
<td>PISA</td>
<td>0.68±0.13</td>
<td>0.05±0.17</td>
<td>-0.072±0.13</td>
<td>0.5533</td>
<td>0.4481</td>
</tr>
<tr>
<td>2DPL</td>
<td>0.85±0.23</td>
<td>-0.22±0.3</td>
<td>0.16±0.21</td>
<td>0.1431</td>
<td>0.161</td>
</tr>
<tr>
<td>PHT</td>
<td>0.86±0.23</td>
<td>-0.23±0.28</td>
<td>0.17±0.18</td>
<td>0.189</td>
<td>0.4092</td>
</tr>
<tr>
<td>3DPL</td>
<td>0.63±0.21</td>
<td>-0.07±0.13</td>
<td>-0.737</td>
<td>-1.000</td>
<td>-</td>
</tr>
<tr>
<td>Gorlin</td>
<td>0.69±0.15</td>
<td>-0.07±0.13</td>
<td>-</td>
<td>-</td>
<td>0.956</td>
</tr>
</tbody>
</table>

PTMC: Percutaneous mitral commissurotomy, MVA: Mitral valve area, PISA: Proximal isovelocity surface area

2D each was noted in the evaluation of MV calcification and for 3D in valve flexibility.

In the pre-PTMC evaluation, the invasively determined MVA showed a better agreement with live 3D results than with PHT or 2D echo results. After the PTMC, the higher accuracy of the live 3D planimetry still remained. Thus, using the invasively determined MVA as the gold standard, live 3D planimetry has a better agreement compared to PISA and 2D echo planimetry in both the pre- and post-PTMC periods. Although PISA also compared favorably with invasive data in the pre-PTMC period, this agreement is lost in the post-PTMC period. The correlation coefficient between 3D planimetry and invasive Gorlin's is significant, i.e., 0.737 which is >0.5 (statistically significant) and the r = 0.956 which is very nearer to 1.000 (statistically significant).

**DISCUSSION**

Due to rapid urbanization and overcrowding, RHMS remains an important public health concern in developing countries. PTMC has become the procedure of choice in symptomatic patients when the stenotic MV is not heavily calcified and mitral regurgitation is not significant because it is cost-effective and safe.1 This technique may also be used in patients with less favorable anatomic features, particularly in patients who are considered to be at high surgical risk such as pregnant women, very elderly patients, and patients with associated severe ischemic heart disease or associated with other comorbidities, i.e., severe pulmonary, renal, or malignant diseases. The results of PTMC are equivalent to those of surgical, open commissurotomy and both give better results than closed mitral commissurotomy.

Although the Gorlin-derived MVA2,3 has been used before and after PTMC, echocardiography is of paramount importance in assessing the indication before this procedure, as well as the success and possible complications afterward. Until recently, MVA was assessed indirectly by the PHT4 method, direct planimetry, 2D transthoracic echocardiography,5 3D transthoracic echocardiography,4-6 or by 3D transesophageal echocardiography; all these methods have their advantages and limitations, patients with RHMS who require an intervention can be easily identified using non-invasive techniques and the results can be predicted by a careful pre-PTMC Doppler echocardiographic evaluation. Before the op PTMC, the pressure gradient, MVA, and severity of valve regurgitation can be used to assess patients' reliability. Prior to PTMC, Doppler echocardiographic estimation of MVA5,10 correlates well with invasive estimation. Immediately following PTMC, the PHT method has been shown to have a poor agreement with invasive data.

There are various reasons for this inaccuracy: The development of an atrial septal defect in many patients after PTMC, and the PHT method assumes that the LA and left ventricular compliances remain stable: This assumption is not valid in the immediate period following PTMC because rapid changes in the LA pressure and left ventricular filling occur in this setting, affecting the compliance of both the left atrium and ventricle. Compared to the PHT method, planimetry (2D or 3D) is not as dependent on hemodynamic variables (heart rate, cardiac index, cardiac rhythm, left ventricular systolic and diastolic dysfunction, left ventricular and atrium compliance, left ventricular hypertrophy, and concomitant valvular disease). Accordingly, planimetry of MVA should be more accurate in the setting of PTMC. Planimetry of MV orifice using 2D echo is a valid method but has its own setoff limitations, especially following commissurotomy when the mitral orifice becomes irregular and technically difficult to trace, particularly if calcium is present. Transthoracic 3D echocardiography5,11 was the most accurate ultrasound technique for measuring MVA, with a better pre- and post-procedural agreement with the invasively Gorlin-derived MVA2 compared to 2D planimetry12 and PHT-derived MVA. The success rate for 3D echocardiography13 in 50 consecutive mitral stenosis patients in this center was 100% for all methods, making transthoracic 3D echocardiography a feasible technique, with an acceptable acquisition and analysis time of approximately 75+5 min. Post-PTMC, the agreement with the Gorlin-derived MVA was much better, in contrast to 2D planimetry and PHT-derived MVA,14 which may be due to the hemodynamic and compliance changes affecting the latter as per Chen et al.11 In addition, compared to conventional 2D planimetry,
live 3D echocardiography was superior, especially post-PTMC. In 2D planimetry, malpositioning errors in depth and angle of the ultrasound beam can easily lead to an overestimation of the MVA up to 88%, which is not an acceptable accuracy for patient management.

Furthermore, it was easier and faster to define the image plane with the smallest orifice area, when 3D echocardiographic planimetry was used and reproducibility for the Wilkins score was better than for 2D echocardiography. Similarly, with PISA which has better correlation coefficient compared as comparable to live 3D echo, the methodology is cumbersome to follow, especially for the beginners, who can do easily the live 3D echo. We also inferred that 3D image data sets, by providing the possibility of “computer slicing” to generate equidistant parallel cross-sections of the MV independently from physically dictated ultrasonic windows allow accurate and reproducible measurement of the MVA.

CONCLUSION

Transthoracic 3D echocardiography offered visualization of the entire MV apparatus, and allowed en face views of the mitral funnel orifice, from which accurate measurements of the MVA can be made pre-PTMC. It was also a very suitable technique for monitoring both the efficacy of the PTMC procedure (commissural splitting, MVA before and after) as well as its complications (leaflet tearing and mitral regurgitation) with a better accuracy compared to 2D planimetry and PHT-derived MVA live 3D 9 echo allowed a different and superior evaluation of the MV apparatus, improving the ability to obtain an accurate measurement of the MVA.

Hence, transthoracic 3D echocardiography is a feasible and accurate technique for measuring MVA in patients with rheumatic mitral stenosis. In pre-, intra-, and post PTMC states compared to the PHT method, PISA and 2D echo planimetry.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Absence of Superficial Palmar Arch with Persistent Median Artery - A Study

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Abstract

Background: Knowledge of the variations in the arterial supply of hand has reached a point of practical importance with the advent of microvascular surgery for revascularization, replantation, and composite tissue transfers. Superficial palmar arch (SPA) has many interesting variations, of them, the median artery (MA) contribution is been evaluated in this study.

Materials and Methods: Present study was conducted on 40 adults upper limbs of unknown sex. All the specimens were obtained from the Anatomy Departments of Government Medical College and Hospital, Chandigarh, India.

Results: In this study, 7.5% of specimens showed median–ulnar type of incomplete SPA.

Conclusion: The clinical importance of the persistence of this artery at wrist level is well documented as a cause of the carpal tunnel syndrome but it has also been associated with the “pronator teres syndrome” in cases where the persistent MA pierces the median nerve in the proximal third of the forearm.

Key words: Median artery, Median nerve, Superficial palmar arch, Ulnar artery

INTRODUCTION

Superficial palmar arch (SPA) is an important arterial anastomotic arcade which is the dominant vascular supply to the majority of the palmar muscles. The high prevalence of variations of SPA makes it an interesting as well as challenging area of study.¹ It is principally formed by the ulnar artery (UA), completed on the lateral side by the superficial branch of radial artery (RA) or arteria princeps pollicis (APP) or arteria radialis indicis (ARI) from RA or median artery (MA) accompanying the median nerve.²

The MA is normally a transitory vessel, which develops from the axial artery of the upper extremity during early embryonic life. It maintains the superficial palmar arch (SPA) while the ulnar and radial arteries are developing.³ When the ulnar and radial arteries develop, the MA usually involutes and does not persist in the post-fetal life.⁴ The MA may persist in adult life in two different patterns, palmar and antebrachial, based on their extent of supply. The SPA formed by the contribution of the MA is of two types, complete and incomplete arch. In the complete type, arch is formed by the contribution of ulnar and MA. In incomplete type, no arch is formed but ulnar and median arteries individually supply the respected areas of the hand.⁵

The origin of the MA in adults has been previously described as arising from the ulnar, intersosseous, radial or brachial arteries.⁶,⁷ According to Huelin, Barreiro and Barcia, two patterns of MA termination have been described based on their vascular territory.

1. The palmar type or embryonal type also shows two variants:
   a. Long type, which ends in the SPA through small arterioles or supplying small vessels to the subcutaneous cellular tissue; before reaches the end; the MA sends branches which Anastomose with the ulnar and radial arteries at the carpus level.
   b. The second variant is digital type. In this type, MA does not contribute in the formation of SPA but
supply the hand by giving common and proper palmar digital branches.

2. The antebrachial type, which represents a partial regression of the embryonic artery is slender, short and terminates before reaching the wrist. Antebrachial type also shows two variants:
   a. Atrophic type-(termination of MA in the upper third of forearm in 74%).
   b. Carpal type-(termination of the MA in distal third of the forearm in 26%).

In this study, the palmar type of MA is highlighted for its significance in contributing the arterial supply to the hand. Knowledge of the variations in the arterial supply of hand is essential in advent of microvascular surgery for revascularization, replantation, and composite tissue transfers. Recent improvements in microsurgical techniques have increased the necessity of better understanding of the vascular pattern of the hand.

Many variations have been reported, but the focus of this study is to record involvement of MA in the formation of SPA. The objective of this study was to evaluate the arterial variations, with special attention to the MA forming the SPA and its major branches.

Aim
The objective of this study was to evaluate the arterial variations, with special attention to the contribution of SPA by MA.

MATERIALS AND METHODS

A total of 40 adults upper limbs embalmed with formaldehyde comprising 20 right, 20 left. Detached limbs were used for the study, and their sex identity could not be determined. Sex variation was therefore not considered. All the specimens were obtained from the Anatomy Departments of Government Medical College and Hospital, Chandigarh, India.

The hands were dissected by first removing the skin covering the flexor surface of the hand with a slight extension proximal to the wrist joint and then distally in the palm to the bases of the digits. The forearms were carefully dissected and observed for the presence of the MA. When there was an MA observed, it was carefully dissected from its origin to its termination. The origin of MA and its relation with the MN was studied in detail. The external diameters of the MA were measured at the distal rim of the flexor retinaculum by a caliper, to a precision of 0.02 mm. The palmar aponeurosis was removed together with the flexor retinaculum by a caliper, to a precision of 0.02 mm.

The palmar aponeurosis was removed together with the flexor retinaculum by a caliper, to a precision of 0.02 mm. The vascular plexuses of the limb buds are initially supplied by four or five consecutive intersegment branches of the dorsal aortae at the levels at which the limb buds are situated. Very early, however, the lateral branch of the seventh cervical and branches of the fifth lumbar intersegmental arteries become much enlarged to form illustrated as well as digitally photographed. The frequency of each pattern was expressed as percentage.

RESULT

Careful dissection of the upper extremities revealed the presence of persistent MA in 3 out of 40 upper limbs (7.5%) and its relation to MN are also noted. We found it two times on the right and one time on the left, respectively. A detailed description of each case is as follows:

Case 1
In one case on the left hand, the MA did not makeup part of the SPA, it supplies separately the middle, index and thumb through a common palmar digital artery, ARI and APP. UA also supplies the medial half of the hand by common palmar digital and proper palmar digital arteries. The diameter of the MA is less, i.e., 1.51 mm as compared to the UA (2.95 mm). The superficial branch of RA was absent in this case (Figure 1).

Case 2
In another case, on the right hand, MA entering into the palm by running parallel to the UA. The MA terminates by giving a common palmar digital artery, ARI, and APP. On the other side, UA gives two common palmar digital and one proper palmar digital artery (Figure 2). The caliber of the MA measured to be 1.56 mm which is less than the UA, i.e., 2.37 mm.

Case 3
In this case on the right hand, MA supplies the lateral 2/3 of the digits. MA gives common palmar digital branch, ARI, and APP. UA also supplies medial 2/3 of the digits by giving two common palmar digital branches (Figure 3). UA is tortuous in nature. MA was measured to be of 1.55 mm diameter which is less than the diameter of the UA (2.10 mm).

In all the three cases, we observed a different arterial pattern in the forearm. Brachial artery was dividing into three branches in the cubital fossa, namely, radial, ulnar, and median arteries (Figure 4). The MA coursed distally to lie alongside the median nerve in the upper third of the forearm and then continued its distal course between the anterior surface of the median nerve and the deep surface of flexor digitorum superficialis.

Embryology
The vascular plexuses of the limb buds are initially supplied by four or five consecutive intersegment branches of the dorsal aortae at the levels at which the limb buds are situated. Very early, however, the lateral branch of the seventh cervical and branches of the fifth lumbar intersegmental arteries become much enlarged to form...
DISCUSSION

The vascular anatomy of the upper limb is a complex and challenging area and has been the subject of many studies. Jaschitschinski studied the SPA in 200 subjects and concluded the median–ulnar in 3%.\textsuperscript{11} Coleman and Anson observed median–ulnar and radial–median–ulnar types of SPA in 3.8% and 1.2% of subjects, respectively.\textsuperscript{12} Al-Turk and Metcalf found the same type of SPA in 4% and 2% of hands, respectively, by using the Doppler ultrasonic flow meter.\textsuperscript{13} Ikeda \textit{et al.} observed median–ulnar type only in 0.9% of subjects.\textsuperscript{14} Loukas \textit{et al.} dissected 200 hands; they found the median–ulnar type in 15%, Adachi (1928; quoted by Keen) reported in 9%, Moraes \textit{et al.} reported occurrence in 13.3%, Olave \textit{et al.} observed the MA of the forearm without anastomosis in 6.7% subjects, and Moraes \textit{et al.} coated in 3.3% subjects.\textsuperscript{15-18} In this study, we observed normally retained, incomplete development or fusion and absorption of parts usually distinct.\textsuperscript{15}

the axial arteries of the upper and lower limb, respectively. In the upper limbs, this axial artery terminates in a capillary plexus from which later, digital branches arise. The proximal part of the artery can be recognized as the brachial artery; its distal portion is the interosseous artery. By 6\textsuperscript{th} week, UA is apparent and branches from brachial artery progressing down the hand plate to form the deep palmar arch. The RA develops later and is more variable progressing down the preaxial side of the limb. Eventually, median and interosseous arteries decrease in size, and MA degenerates, providing only some blood supply to median nerve the small vestige of interosseous artery terminates in many small branches (rete system). The anomalies of blood vessels may be due to the choice of unusual paths in the primitive vascular plexuses, the persistence of vessels
the above rare variant of SPA of ulnar–median type in 7.5% subjects (n = 3/40).

The origin of MA has previously been described as arising from the common interosseous artery, anterior interosseous artery, and ulnar arteries frequently but it can also arise from the brachial arch, superficial brachial artery, and deep brachial artery. According to Varley et al., when the MA arise from the RA, it may increase the risk of hand ischemia if the RA is sacrificed during harvesting. In this study, we encounter the MA taking origin from the brachial artery in all the cases.

The external diameter of a persistent MA is important, especially in the carpal tunnel. According to Barfred et al., the MA with an external diameter of more than 2.0 mm can cause MN compression. They operated 239 patients with carpal tunnel syndrome (CTS) and found the MA of considerable caliber in 4% cases. Gassner et al. found two MA with a diameter of 3.00 mm, Libersa et al. reported diameter ranging from 0.5 to 2.7 mm, Nayak et al. observed diameter of the MA between 0.8 and 2.6 mm. In this study, we obtained the diameter ranging from 1.51 to 1.56 mm. The MA can increase in the caliber due to thrombosis, aneurysm, calcification, or congenital regions, which may lead to CTS.

Nayak et al. analyzed the course of the MA in relation with the MN, they observed three distinct pattern: (a) The MA was lateral to the MN in the forearm, (b) the MA crossed the MN when the artery splitted the nerve in the forearm, and (c) the MA was anterior to the MN in the carpal tunnel. In the current study, we noticed the MA running lateral to the median nerve in the forearm and while entering into the palm it crosses the median nerve anteriorly. The above details should be taken into consideration while approaching the forearm and hand for various surgical procedures as both the MA and the MN are in close proximity with each other throughout the forearm and hand.

CONCLUSION

This study highlights a palmar type of digital variety of MA in the 3 cases, so this study has provided details about one of the variants of SPA in humans. In this three cases, no superficial palmar arch is formed but ulnar and median arteries individually supply the respected areas of the hand. The knowledge of median–ulnar pattern of superficial palmar arch helps in accurate planning and better performance of surgical procedures in the forearm. Association of a persistent MA with the median nerve should be considered in the evaluation of all patients with carpal tunnel syndrome, pronator teres syndrome, and anterior interosseous syndrome.

REFERENCES

Comparative Study of Urinary Retention in Lower Limb Surgeries between General and Spinal Anesthesia

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Abstract

Introduction: Urinary retention is very common after general anesthesia (GA) or spinal anesthesia (SA) especially following lower abdominal and lower limb surgeries.

Aim: Aim of the study is to study the incidence and duration of urinary retention following general and SA and to compare the effects of these two types of anesthesia on it.

Materials and Methods: A total of 84 patients with physical status I and II were divided into two groups; 42 each. All the patients undergoing orthopedic surgery (arthroscopy, tibia shaft fracture fixation, and screws fixation in ankle fractures) of the lower limb lasting above 60 min were divided into groups, Group A was administered GA and Group B was given SA.

Results: The incidence and duration of urinary retention, residual volume, spontaneous micturition, and mechanisms presumed were different in both groups and were statistically significant.

Conclusion: Urinary retention was found to be more common after spinal than GA in the study. Abdominal ultrasound examination was found to be a reliable, noninvasive, inexpensive, and simple method to measure bladder volume postoperatively.

Key words: Anesthesia, Bladder reflexes, General anesthesia, Neurotransmitters, Post-operative urinary retention, Spinal

INTRODUCTION

Post-operative urinary retention (POUR) is defined as the inability to voluntarily empty the bladder after anesthesia and surgery.¹ POUR is usually treated by catheterization of the bladder, but at what volume of urine in bladder one should definitely catheterize is not known which has resulted in different criteria for catheterization.² Baldini and Carli reported the incidence of POUR in elective total hip arthroplasty and elective total knee arthroplasty patients as ranging from 0% to 75%.³ POUR poses a challenge to the surgeon and prolongs the morbidity and hospital stay in patients undergoing all surgeries especially lower limb operations.⁴ According to Baldini's meta-analysis, the overall incidence of POUR following general anesthesia (GA) was lower when in compared with conduction blockade.⁵ Bupivacaine and tetracaine used in spinal anesthesia (SA) delay the return of bladder function even after the resolution of sensory anesthesia which leads to distention of the bladder beyond its normal functioning capacity resulting in POUR or even bladder damage.⁶ A close workup by urology specialists and other surgeons is required to create evidence-based guidelines for POUR and its treatment.

POUR is common after any type of anesthesia and surgery on lower limbs and lower abdominal. Multiple afferent, efferent neural pathways, reflexes and central and peripheral neurotransmitters play a role in the process of micturition physiology. During the pre-operative period, the patient experiences a myriad of insults which may interrupt this physiological process leads to the development of urinary retention.⁶ The two main causes of POUR are mechanical obstruction of the urinary outflow tract and the altered
neural control of the bladder and detrusor mechanism, most commonly due to analgesic drugs. This study aims to study the clinical parameters of patients, incidence and time periods of urinary retention following general and SA and to compare.

MATERIALS AND METHODS

This study was a prospective clinical study conducted in a Tertiary Teaching Hospital; Kannur Medical College, Anjarakandy, Kannur, Kerala. The study period was conducted between February 2013 and January 2014. 84 consecutive patients undergoing orthopedic surgeries on the lower limbs (arthroscopy, tibia shaft fracture fixation, and screws fixation in ankle fractures) were allotted. They were divided into two groups. Group A was operated under GA and Group B was operated under SA. Allotment of the patients to the above groups was done by first (and original) generator which randomizes each subject to a single treatment by using the method of randomly permuted blocks available online: Www.randomization.com. Ethical Committee Clearance Certificate obtained before starting the study. Ethical Committee Cleared Consent form was used for the patients.

Inclusion Criteria
1. Patients aged between 18 and 55 years were included,
2. Patients undergoing lower limb surgeries were included,
3. Patients with the American Society of Anesthesiologists – physical status I and II were included.

Group A was performed surgery under GA and Group B was performed under SA using bupivacaine.

Exclusion Criteria
1. Patients aged below 20 years and above 55 years were excluded,
2. Patients with prostate hyperplasia, genitor-urinary disease were excluded,
3. Patients with intraoperative blood loss of more than 200 ml were excluded,
4. Patients giving a history of alcohol abuse and narcotic abuses were excluded.

All patients were allowed to micturate before entering the operating theater. During the procedure, all the patients were transfused with 1000 ml of ringer's lactate. Portable ultrasonography was used to estimate the urine volume in the bladder before and after the surgery.

GA Method
Preanesthetic medication injection atropine 1 amp was given. Patients were induced by intravenous (IV) method using injection fentanyl 1 mg/kg, propofol 2 mg/kg and atracurium 0.5 mg/kg to induce muscle relaxation for tracheal intubation. Controlled ventilation was maintained in a closed valvular system using 50% air and 50% oxygen. Anesthesia was achieved by the administration of 2% isoflurane and maintained until the end of surgery. During surgery, 1000 ml ringer lactate was given IV. Post-operative pain was measured on a numeric rating scale (0-10). Ketorolac 30 mg i.m. was used as bolus dose if required. Ultrasound scans of the bladder were performed hourly after surgery until spontaneous micturition or catheterization occurs.

SA Method
Patient in the lateral or sitting position, the subarachnoid space was punctured with a 25 G spinal needle at L3/4 or L4/5 using a median or paramedian approach until there was free backflow of cerebrospinal fluid, and 3 ml of hyperbaric bupivacaine 0.5%. After 3 min, patients were returned to the supine position. During surgery wherever required ephedrine, midazolam, or both were administered IV. Urinary retention was diagnosed by ultrasonography; the POUR being defined as a bladder volume P500 ml together with the inability to micturate or post-residual volume >500 ml. The patients were catheterized when these criteria were met. All the data were analyzed by online http://www.socscistatistics. com as follows: Description of quantitative variables as mean ± standard deviation. Description of qualitative variables as number and percentage. The patients with POUR were expressed by percentage alone. Paired t-test was used to compare between urine volume before SA and before spontaneous micturition, and before spontaneous micturition and post-urination residual volume. P < 0.05 is considered significant.

RESULTS

A total of 84 patients who underwent lower limb orthopedic surgery in a tertiary teaching hospital were included in this study. In Group A (GA), there were 42 patients, and in Group B (SA), there were 42 patients. In Group A, there were 36 males and 6 females and in Group B 35 males and 7 females. The mean age in Group A was 33 ± 7.6 and in Group B it was 37 ± 8.2. The mean weight Group A was 76.4 ± 2.8 and in Group B it was 73 ± 4.1. The duration of surgery in Group A was 69 ± 6.8 min and in Group B it was 71 ± 2.6. In both, the groups IV fluids given was 1000 mL ringer lactate. In Group A, arthroscopy was done in 42.85% of the patients and in Group B 35.71%. In Group A, tibia shaft fracture fixation was done in 38.09% and in Group B 35.60%. In Group A, screws fixation in ankle fractures was done in 71.43% and in Group B 61.9%. Chi-square calculator
for 5 × 5 contingency table was used, and there were no statistically significant differences among two Groups A and B related to age, sex, weight, and duration of surgery. The Chi-square statistic was 0.3883 and the \( P = 0.983 \) (Table 1).

The volume of urine in the bladder was measured using ultrasonography at the time before surgery (Group A: 31 ± 6.3, Group B: 30 ± 5.5), before micturition (Group A: 598 ± 4.8, Group B: 503 ± 3.4) and the residual volume (Group A: 119 ± 2.2, Group B: 128 ± 3.6) and found that there were no statistically significant differences among two groups A and B related to urine volume before operation, before micturition and residual volume. The Chi-square statistic was 0.087, and the \( P \) value was 0.957 (\( P \) significant at 0.05) (Table 2). Patients presenting with POUR were 11.90% in Group A and 30.95% in Group B (Table 2).

The time lapse between the spinal or GA till micturition was observed in both groups and found that in Group A it was 176 ± 3.8 min and in Group B it was 414 ± 7.4 min. The results were statistically significant between the two groups with \( P \) value at 0.0482 (\( P < 0.05 \)) (Table 3).

**DISCUSSION**

This study is a prospective clinical analysis of incidence and burden of POUR in two groups of patients undergoing surgeries on the lower limb in a tertiary teaching Hospital at Kannur, Kerala. The incidence of POUR is common among lower abdominal and lower limb surgeries either performed under GA or SA. The urinary volume in patients with POUR before voiding among the GA (Group A) patients was 598 ± 4.8 ml and 503 ± 3.4 ml in Group B. The results were comparable to the similar study by Breebaart et al.\(^9\) Post-operative residual urine volume in this study was 119 ± 2.2 ml in Group A and 128 ± 3.6 in Group B; comparable with Kreutziger et al.\(^9\) In this study, the post-operative voiding residual urine volume in Group A patients was less than that in patients of Group B. Contrary to this the study conducted by Chu et al.\(^10\) showed higher residual urine volume in patients undergoing surgeries under GA than under SA. Most probably this difference may be due to the difference in neuroaxial techniques used. The incidence of POUR in Group A was 11.90% and in Group B 30.95%; lower in GA group and higher in SA group. This was contradicted in the study by Lingaraj et al.\(^7\) Who found the percentage of POUR 5.3% in GA group, 0% in SA group. The results of Kotwal et al.\(^11\) showed POUR in 38% of patients receiving SA and 22% of patients receiving GA. The difference may be due to the patients’ age. They were older (the median patients age was 68 years, range 34-89 years), but in this study, the mean age of Group A was 33 ± 7.6 and in Group B it was 37 ± 8.2. Total time lapse from the starting of anesthesia till micturition was 414 ± 7.4 min following administration of SA. In a similar study by Gupta et al.,\(^12\) it was 501 ± 59 min (higher), which may be due to the usage of 6.0 mg bupivacaine plus 25 mg fentanyl causing urine retention increase by 15%. In the study by Kreutziger et al.\(^9\) micturition since spinal (hyperbaric prilocaine) anesthesia was (276 ± 59 min); in this study, it was 414 ± 7.4 ml. The incidence of POUR may depend on the type of anesthesia, anesthetic technique used and the anesthetic drugs used. The bladed walls are constituted by detrusor muscle, and two sphincters. It has a capacity of 400-600 ml. The two systems are governed by spinal reflexes and two pontine brain stem centers. The voluntary control of the bladder involves the coordination among the frontal cortex and the pontine centers. At bladder volume of 150 ml, when voiding threshold is reached; the first urge is felt and at 300 ml sense of fullness is created.\(^2\) General

### Table 1: The gender, weight, duration of surgery and types of surgeries undertaken in the study Groups A and B (n=84)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A (GA)-42</th>
<th>Group B (GA)-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>Females</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Age</td>
<td>33±7.6</td>
<td>37±8.2</td>
</tr>
<tr>
<td>Weight</td>
<td>76.4±2.8</td>
<td>73±4.1</td>
</tr>
<tr>
<td>Duration of surgery</td>
<td>69±6.8</td>
<td>71±2.6</td>
</tr>
<tr>
<td>Fluids given</td>
<td>1000 ml</td>
<td>1000 ml</td>
</tr>
<tr>
<td>intra-operatively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthroscopy</td>
<td>18-(42.85%)</td>
<td>15-(35.71%)</td>
</tr>
<tr>
<td>Tibia shaft fracture fixation</td>
<td>16-(38.09%)</td>
<td>21-(50%)</td>
</tr>
<tr>
<td>Screws fixation in ankle fractures</td>
<td>08-(19.04%)</td>
<td>06-(14.28%)</td>
</tr>
</tbody>
</table>

#### Data of age, gender, body weight and duration of surgery were presented as means SD, GA: General anesthesia, SA: Spinal anesthesia, Standard deviation

### Table 2: The volume of urine at different point of times in both the Groups A and B (n = 84)

<table>
<thead>
<tr>
<th>Observation-volume of urine on U/S examination</th>
<th>Group A (GA)-42 in mL</th>
<th>Group B (SA)-42 in mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before operation</td>
<td>31±6.3</td>
<td>30±5.5</td>
</tr>
<tr>
<td>Before micturition</td>
<td>598±4.8</td>
<td>503±3.4</td>
</tr>
<tr>
<td>Post-operative residual volume</td>
<td>119±2.2</td>
<td>128±3.6</td>
</tr>
<tr>
<td>Patients with POUR%</td>
<td>5-(11.90%)</td>
<td>13-(30.95%)</td>
</tr>
</tbody>
</table>

Means compared statistically showing significant difference at \( P < 0.05 \); results for urine volume before operation, before micturition and residual volume were presented as means SD. GA: General anesthesia, SA: Spinal anesthesia, SD: Standard deviation, POUR: Post-operative urinary retention

### Table 3: The time lapse between anesthesia and micturition in Groups A and B (n=42)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A (GA)-42</th>
<th>Group B (SA)-42</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time lapse from the starting of anesthesia till micturition (min)</td>
<td>176±3.8</td>
<td>414±7.4</td>
</tr>
</tbody>
</table>

Means compared statistically showing significant difference at \( P < 0.05 \); results for urine volume before operation, before micturition and residual volume were presented as means SD. GA: General anesthesia, SA: Spinal anesthesia, SD: Standard deviation
anesthetics cause bladder atony by acting as smooth muscle relaxants and by interfering with the autonomic regulation of detrusor tone. In vitro studies have shown that clinical doses of halothane and thiopentone decrease bladder response to stimulation.13 Volatile anesthetics and sedative-hypnotics inhibit the pontine micturition center and voluntary cortical control of the bladder, suppressing detrusor contraction, and the micturition reflex.5 Other drugs given with GA may control of the bladder, suppressing detrusor contraction, inhibit the pontine micturition center and voluntary cortical increase time to discharge ambulatory surgical patients.19

The patients experience increased rates of POUR when intrathecal local anesthetics are administered with opioids, and the addition of fentanyl to SA and the choice of spinal over epidural anesthesia were found to significantly increase time to discharge ambulatory surgical patients.19

CONCLUSION

POUR is common after spinal than GA in patients undergoing lower limb surgeries. Post-operative bladder volume could be measured by transabdominal ultrasonography as it is a reliable, noninvasive, inexpensive, and simple method.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Profile of Burn Cases at a Tertiary Care Hospital in Goa, India

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Burn injuries rank very high as most severe types of injuries suffered by the human body and attributing high morbidity and mortality among victims. They can be inflicted by heat, scalds, open fire, electricity, friction or contact with chemical substances, radiations, etc. Problems associated with burns are multi-faceted, comprising death, disabilities, disfigurement, psychosocial problems, stigma, etc. Burn injuries are more common in developing countries like India due to various socio-cultural factors, namely, illiteracy, poor living and housing conditions, poverty, poor substandard electrical wiring, malpractices like dowry. There is lack of awareness and ignorance regarding burn injuries coupled with difficulty in accessing health-care services.

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INTRODUCTION

Burns are a global public health crisis, accounting for an estimated 265,000 deaths annually. In India, over 1 million people are moderately or severely burnt every year. It is estimated that fire-related burns account for 10 million disability-adjusted life years lost globally each year. Most of the burn injuries are seen in low- and middle-income countries. Burns are a leading cause of disability and disfigurement. Burn is a unique, but common mode of suicide as well as homicide worldwide.

Burn injuries rank very high as most severe types of injuries suffered by the human body and attributing high morbidity and mortality among victims. They can be inflicted by heat, scalds, open fire, electricity, friction or contact with chemical substances, radiations, etc. Problems associated with burns are multi-faceted, comprising death, disabilities, disfigurement, psychosocial problems, stigma, etc. Burn injuries are more common in developing countries like India due to various socio-cultural factors, namely, illiteracy, poor living and housing conditions, poverty, poor substandard electrical wiring, malpractices like dowry. There is lack of awareness and ignorance regarding burn injuries coupled with difficulty in accessing health-care services.

The data on the burden of the burn injuries is either inaccurate or inadequate, so the present study was undertaken to find out the prevalence of accidental and suicidal burns at a Tertiary Care Hospital in Goa, India.
Aims and Objectives
1. To study the prevalence of accidental and suicidal burn patients at Tertiary Care Hospital in Goa.
2. To study the demographic and clinical profile and treatment outcome of burn patients at Tertiary Care Hospital in Goa.

MATERIALS AND METHODS

• Study design: Record based study.
• Study setting: Goa Medical College.
• Study period: January 2016-December 2016.
• Study population: The medical records of patient aged 15 years and above admitted in the Burn unit of Surgery Department of a tertiary care Hospital in Goa, from January 2016 to December 2016.

Inclusion Criteria
Patients with burns aged 15 years and above admitted to the burn unit of Surgery Department from January 2016 to December 2016 were included in the study.

Exclusion Criteria
Patients with burns <15 years of age were excluded from the study.

Data Collection
Data of patients with burns admitted to the burn unit of surgery departments such as information age, sex, place of residence, time of occurrence, mode of injury, Total body surface area (TBSA) involved, and other aspects were obtained from medical records.

Ethical Consideration
Ethical clearance was obtained by the Institute ethical committee.

Data Analysis
Data were analyzed using SPSS Version 22.5

Definitions
Burn injury
A burn injury was diagnosed as defined by WHO’s ICD-10 classification system (T20-32).6 These included smoke, fire, and flames (X00-09), contact with hot substances (X10-19), electric current (W85-87) and corrosive substances (X46-49). This also includes scalds and burns due to electric heating appliances, flame, chemical burns, and other thermal burns.

TBSA
TBSA was estimated by the “rule of nines.”7

OBSERVATIONS AND RESULTS

A total of 170 burn patients were included in the study. The prevalence of accidental burns was 87.1%, and that of suicidal burns was 12.9%. There were no homicidal cases reported in the records. It can be shown in Table 1, accidental cases of burns were highest (78.5%) among the age group of 26-50 years, as also suicidal burns 21.5% in the same age group. It was observed that major proportion of burn patients were females (78.5%) in both accidental and suicidal burns. Major proportion of burn patients (88%) were Hindus by religion. Major proportion of burn patients were married individuals as compared to unmarried, widowed, divorced, or separated. Major proportion of accidental burns patients were unemployed (90.2%), whereas the major proportion of suicidal burns patients were employed (16.7%). Major proportion of both accidental (87.1%) and suicidal (12.9%) burns were among the rural population. Major proportion of burns patients sustained burn injuries at home (78.2%). Major proportion of burns were caused by stove burst (40%) followed by liquid petroleum Gas leakage.

In Table 2, major proportion of accidental burn patients (35.8%) had 26-50% of the TBSA involved whereas major proportion of suicidal burns patients (86.4%) had >75% TBSA. Major proportion of patients with accidental burns (38.5%) were injured from 12 pm to 6 pm, whereas major proportion of suicidal burns 9 (40.9%) were seen between 12 am and 6 am. The outcome of major proportion of accidental burn patients (54.1%) was survival and subsequent discharge from the hospital, whereas death ensued during hospitalization in major proportion of suicidal burn patients (86.4%).

DISCUSSION

In this study, it was observed that major proportion of burn patients, both accidental and suicidal, were in the age group between 26 and 50 years. These findings were also reported in a study conducted by Sarma and Sarma8 wherein major proportion of burn patients were in the age group between 21 and 40. In this study, major proportion of both accidental and suicidal burn patients were females. Studies conducted by Liu et al.,9 Gupta et al.,10 Ghuliani et al.11 reported major proportion of burn patients as females. In the present study, major proportion of burn patients were females as also reported in several studies such as Morales et al., Bariar,12 Subrahmanyam,13 wherein burns cases were in females.

In the present study, major proportion of burn patients were rural. Similar findings have been reported by Bariar.12 In the present study, major proportion of burns injuries...
were sustained at home, and several studies like Jayaraman et al.,14 Gupta et al.,10 Ghuliani et al.11 report similar findings.

Prevalence of accidental burns was 87.1% and of suicidal burns was 12.9%. In a study conducted by Gupta et al.15 in Punjab 87% of patients sustained accidental burns while 9% and 4% sustained suicidal and homicidal burns, respectively. TBSA involved was higher in suicidal burns (86.4%) as compared to accidental burn injury. In a study in a tertiary care hospital in Punjab, 53% of patients sustained flame burns involving more than 45% of TBSA.15 Outcome of major proportion of accidental burn victims (54.1%) was survival and subsequent discharge from hospital, whereas death ensued during hospitalization in major proportion of suicidal burn victims (86.4%). In a study conducted by Castana et al., on outcomes of suicidal burn victims, deceased patients usually have a larger extent of burns16

**CONCLUSION AND RECOMMENDATION**

Burns continue to be a major public health problem. To prevent burn injuries, it is necessary to develop a broad-based strategy including a spectrum of burn control measures, including burn prevention and strengthened burn care, as also better information and surveillance systems, and more investment in research and training.

**REFERENCES**

5. SPSS Version 22. [Last accessed on 2017 Feb 18].

How to cite this article: Nadkarni M, Silva VP, Dias M. Profile of Burn Cases at a Tertiary Care Hospital in Goa, India. Int J Sci Stud 2017;5(1):138-140.

Source of Support: Nil, Conflict of Interest: None declared.
Yes, Eclampsia is Preventable - A Study at GRH, Madurai

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Abstract

Background: The purpose of this study was to determine whether eclampsia is potentially preventable with focus on booked and unbooked cases.

Materials and Methods: All the cases of eclampsia referred from nearby, civil hospitals, rural areas, and private hospitals in the period of 2016.

Results: A total of 534 cases were studied at GRH Madurai (GHT cases including eclampsia) of which 39 cases are of eclampsia. The incidence was 7.4%. 97.4% of cases had irregular antenatal visits and were unbooked under GRH, Madurai. Mean age group was 21 years. 65% of the cases were primigravida. Antepartum (AP) eclampsia was the most common seen with 64% incidence. In 25 cases of AP eclampsia, 80.7% had a cesarean section while 14.3% had a vaginal delivery; 5% had operative vaginal delivery.

Conclusion: We concluded this serious complication of pregnancy is due to the lack of antenatal care in rural areas and urban slums to prevent it, personnel at civil hospitals should be trained to of administering magnesium sulfate, an anticonvulsant as after giving a loading dose none of the patients threw a fit. Cases booked and immunized at GRH, Madurai with regular follow-up did not develop eclampsia.

Key words: Eclampsia, Magnesium sulfate, Tertiary hospital

INTRODUCTION

By the end of 20th century, in developed countries eclampsia incidence is reduced, in developing countries like India it still remains an important cause of maternal and perinatal morbidity and mortality. It is estimated that 50,000 maternal deaths occur worldwide every year due to eclampsia most of which occur in developing countries. Incidence of eclampsia is still high due to improper antenatal care though it is a preventable complication.

MATERIALS AND METHODS

Madurai Medical College is a tertiary hospital. For higher treatment cases are referred from nearby rural areas, Community Health Centres (CHCs), Primary Health Centres, civil hospitals and private nursing homes are sent here. A total number of cases studied 534 in period 2016 of which eclampsia cases were 39.

All the cases were started on Pritchard’s regime, magnesium sulfate 4 an intravenous (I/V) bolus dose and 5 g in I/M in each buttock followed by 5 an I/M in alternate buttock 4 hourly and tablet labetalol for control of blood pressure with supportive care in form of I/V line, oxygen inhalation and mouth gag, suction, continuous catheterization, etc.

After stabilization of the patient, obstetrical management was carried out.

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RESULTS

• The incidence of eclampsia came out to be 7.4%. All cases were unbooked and referred from nearby CHCs, civil hospitals, and private nursing homes.
• Maximum number of cases was between age groups of 21 and 25 years (62%) 26% were below 20 years of age and 12% above 25 years.
• Highest number of females was primigravida (65%); antepartum (AP) eclampsia was the most common (64%), followed by postpartum (PP) eclampsia (31%) and intrapartum eclampsia (5%).
• The majority of the cases had irregular antenatal check-up. A large number of cases belonged to rural background.
• About 80.7% had a caesarean section while 14.3% had a vaginal delivery; 5% had operative vaginal delivery (Tables 1-4).

In our study, maximum number of patients presented in the third trimester of pregnancy (94%) except 6% who had gestation of <34 weeks. None of the patients threw a fit after initiation of magnesium sulfate therapy. Maternal complications occurred in the form of disseminated intravascular coagulation, PP pyrexia, oliguria, and PP hemorrhage. The complication rate came out to be 23%. Maternal mortality in present study came out to be nil. There were 56% alive births, 30% preterm births of which 12% early neonatal deaths.

DISCUSSION

• The incidence was 7.4% which is high as compared to other studies. The incidence seems high as compared to reported incidence in Indian referral hospitals.
• About 79% of the cases were referred from nearby civil hospitals, CHCs and private nursing homes in the present study.
• Most of the cases in our study were from the rural area, unbooked with irregular antenatal check-up. Similar findings were reported by Samal et al., Khantun et al., and Chandra and Bhardwaj.1,5
• Most of the cases were primigravida. Sheraz et al. (69.1%), Datta et al. (66.0%) and Shaheen et al. (69%) also reported maximum occurrence of eclampsia in prime.
• The prevalence of AP eclampsia came out to be highest which is comparable to the studies of Sarna (69.23%), Sheraz et al. (67.3%) and Shaheen et al. (62%).6-9
• Maximum number of cases were between 21 and 25 years of age which is comparable to Sarma (71.79%) and Sheraz et al. (78.2%).
• Most of our subjects presented with fits at term pregnancy (72%). Similar findings were reported by Chaudhary.
• None of the patients threw another fit after receiving loading dose of magnesium sulfate. Same findings were seen by Samal et al.4
• Maternal mortality is nil in the present study, comparable to that of Sheraz et al. (3.6%), Gaddi and Somegowda (5.4%) 11 but less as reported by Nobis (11.54%).
• 12 maternal mortality was high but comparable to that reported by Nobis (42.96%). 12 others have reported less maternal morbidity.
• Perinatal mortality in this study came out to be 30%, reported by Gaddi and Somegowda (39.3%) and Khantun et al. (38%) (Table 5).10,11

<table>
<thead>
<tr>
<th>Table 1: Booked/unbooked/referred cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booked</td>
</tr>
<tr>
<td>Unbooked</td>
</tr>
<tr>
<td>Referred (from nearby CHCs, CH, private nursing homes)</td>
</tr>
</tbody>
</table>

CHC: Community Health Centres

<table>
<thead>
<tr>
<th>Table 2: Eclampsia type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Primigravida</td>
</tr>
<tr>
<td>Multigravida</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Type of eclampsia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>AP</td>
</tr>
<tr>
<td>IP</td>
</tr>
<tr>
<td>PP</td>
</tr>
</tbody>
</table>

PP: Postpartum, IP: Intrapartum, AP: Antepartum

<table>
<thead>
<tr>
<th>Table 4: Maternal complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complications</td>
</tr>
<tr>
<td>DIC</td>
</tr>
<tr>
<td>Postpartum pyrexia</td>
</tr>
<tr>
<td>PPH</td>
</tr>
<tr>
<td>Oliguria</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

PPH: Postpartum hemorrhage, DIC: Disseminated intravascular coagulation

<table>
<thead>
<tr>
<th>Table 5: Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>Total number of patients</td>
</tr>
<tr>
<td>Non severe preeclampsia</td>
</tr>
<tr>
<td>Severe preeclampsia</td>
</tr>
<tr>
<td>Chronic hypertension</td>
</tr>
<tr>
<td>Imminent eclampsia</td>
</tr>
<tr>
<td>AP eclampsia</td>
</tr>
<tr>
<td>IP eclampsia</td>
</tr>
<tr>
<td>PP eclampsia</td>
</tr>
<tr>
<td>HELLP syndrome</td>
</tr>
</tbody>
</table>

PP: Postpartum, IP: Intrapartum, AP: Antepartum
CONCLUSION

We concluded that because of improper antenatal care incidence of eclampsia is still high in rural areas and urban slums. Hence, this area is to be focused to prevent this serious complication of pregnancy. Eclampsia can be prevented if the pregnant women can get proper health education and regular antenatal care.

Early antenatal booking, regular follow-up, knowledge of associated risk factors and to detect this condition early are essential to prevent it.

Proper management of pregnancy induced hypertension and in time referral to higher center is important step, as it is associated with high maternal morbidity and mortality and poor perinatal outcome. Personnel at community centers, civil hospital, and private doctors should be referred after giving primary treatment, i.e. magnesium sulfate, an anticonvulsant as delay in treatment leads to complications.

REFERENCES


How to cite this article: Chitra KS, Sudha M, Trupti N. Yes, Eclampsia is Preventable - A Study at GRH, Madurai. Int J Sci Stud 2017;5(1):141-143.

Source of Support: Nil, Conflict of Interest: None declared.
Mitral Valve Doppler E/e’ as a Prognostic Marker in Acute Myocardial Infarction

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Abstract

Background: The early diastolic tissue Doppler velocity of the mitral valve annulus (e_) reflects the rate of myocardial relaxation. In combination with measurement of the early transmitral flow velocity (E), the resultant ratio (E/e’) correlates well with mean left ventricular end diastolic pressure (LVEDP). In particular, an E/e’ ratio >15 is a valuable predictor of an elevated mean LVEDP. We proposed that an E/e’ ratio >15 would predict lower survival after acute myocardial infarction (MI).

Materials and Methods: Transthoracic echocardiograms were obtained in 50 consecutive patients immediately after admission for MI. The patients were followed up until their hospital discharge. The end point was all-cause mortality.

Results: E/e’ had a strong correlation in predicting death as an outcome of the total of 16 patients with an E/e’ ratio of >15 suggestive of elevated LV filling pressures. 0.6 of these patients did not survive to hospital discharge amounting to a mortality rate of 37.5% in that group (average mortality 14%). In contrast in patients who had an E/e’ ratio of <15 the mortality rate was low at 2.94%.

Conclusions: Thus, E/e’ ratio can be used as a surrogate marker of elevated LV filling pressure and hence can be reliably used as a prognostic marker to risk stratify patients admitted in coronary care units over and above other non-invasive tools already available.

Key words: Acute myocardial infarction, E/e’ ratio, Left ventricular filling pressure, Non-invasive marker

INTRODUCTION

Variable degrees of systolic dysfunction is prevalent after a myocardial injury and the pathophysiological principles underlying this dysfunction and its effect on the outcomes of the patient has been the subject of several path breaking studies which have contributed to modification in therapeutic strategies in a radical manner.¹ ⁷

Moreover, heart failure demonstrated by clinical or radiographic evaluations over and above decreased systolic function is a strong predictor of prognosis after myocardial infarction (MI). Seemingly benign myocardial damage can lead on to signs of pulmonary congestion indicating elevated ventricular end diastolic pressure.

This has been attributed to impaired active relaxation of the myocardium and increased chamber stiffness leading onto abnormal diastolic function.

This has to be determined by invasive cardiac catheterization studied with the use of micromanometer catheters such an invasive strategy is not practical for use on a daily basis.⁶ ¹⁸

Effect of Elevated End Diastolic Pressures on the Prognosis After MI

Since direct measurements of diastolic ventricular pressures are difficult to obtain, non-invasive evaluation of ventricular diastolic pressures using E/Vp or E/e’ could come in handy. This was recently shown in a retrospective study of a group of patients with MI where an elevated E/e’ ratio accurately predicted mortality in addition to ejection fraction (EF), age, and a restrictive filling.¹⁹ More
importantly, $E/e'$ was used for risk stratification in patients groups with normal as well as abnormal ventricular systolic function. The patients with pseudonormal filling (moderate increase in filling pressures) despite preserved LV systolic function have worse outcomes, and this finding concurs with the results of studies in which the $E/Vp$ ratio was used.\textsuperscript{20,21}

**Left Ventricular (LV) Diastolic Pressure and its Prognostic Value in Acute MI (AMI)**

Elevated ventricular diastolic pressures are associated with a high incidence of death after AMI.\textsuperscript{22-25} Higher ventricular diastolic pressures suggest larger area of myocardial damage with more severe systolic dysfunction.\textsuperscript{26-29} Moreover, ventricular pressure overload predisposes to ventricular, which would portend a worse outcome.

Apart from its prognostic value, the evaluation of ventricular diastolic pressures requires invasive measurements. On the other hand, Doppler echocardiographic assessment of mitral flow provides us with a non-invasive method of pin pointing patients with elevated left atrial pressures. Mild degrees of diastolic dysfunction is shown by impaired relaxation.

Advanced diastolic dysfunction is a poor prognostic indicator portending with a worse outcome after AMI, exemplified abbreviated deceleration time (DT) which is very specific. They support the well-established prognostic value of clinical indicators of ventricular diastolic pressures, such as Killip class.

**Value of E/e’ as a Prognostic Indicator**

The study by Hillis \textit{et al.} shows that, in the setting of AMI, elevated $E/e'$ reasonably correlated with conventional transmitral Doppler evidence of elevated ventricular diastolic pressure. Moreover, it is a better prognostic indicator. This is in consonance with studies that demonstrated that $E/e'$ better correlated with invasive measurement of LVEDP.\textsuperscript{29} $E/e'$ was also better correlated with Killip class on admission but, emerged to be a better predictor of survival. An $E/e'$ ratio >15 was the most useful predictor of an worse outcome, regardless of EF, the presence or absence of ST-segment elevation, or drug treatment on hospital discharge.

The $E/e'$ ratio was superior to all known measures of LV systolic function, such as EF and Wall motion scores, for prediction of prognosis. However, it is prudent to understand that measurement of $E/e'$ provides only additional prognostic data, with the greatest knowledge obtained by combining this information with clinical, systolic, and conventional diastolic parameters.\textsuperscript{23,30}

**MATERIALS AND METHODS**

**Study Center**
Coronary Care Unit of the Department of Cardiology, Government General Hospital (GGH), Chennai.

**Study Design**
Prospective, observational and cross-sectional study.

**Study Sample**
Consecutive patients admitted in Coronary Care Unit between January 2014 and March 2014 at the Department of Cardiology, GGH, Chennai with a diagnosis of, ST-elevation MI ($N = 50$).

**Study Methods**
Detailed history and cardiovascular examination was done with informed consent from the patient. Patients were followed-up from admission to hospital discharge. Echocardiography with color Doppler and tissue Doppler imaging of mitral valve (MV) will be done. The following echocardiographic parameters were studied in detail within 24 h of admission by a single operator.

1. EF
2. LV dimensions
3. Mitral E and A velocity (m/s)
4. Mitral $e'$ velocity
5. Mitral E wave DT
6. E/e’ ratio.

**Statistical Analysis**
All the statistics were analyzed using the SPSS version 17 software and the tests used were mean and standard deviation, Chi-square test, independent $t$-test, and other relevant tools.

**RESULTS AND DISCUSSION**

**E/e’ Ratio, its Distribution and Correlation**

About 34 of the total 50 patients had an $E/e'$ ratio of <15 and the remaining 16 patients had an $E/e'$ of >15. This constituted 68\% and 32\% of the total study participants respectively (Table 1).

A majority of patients (68\%) in the study group had on $E/e$ of <15 indicating normal LV filling pressures.

Among the patients with elevated filling pressures as manifested by an $E/e'$ ratio of>15 nearly 88\% of the patients had an abbreviated DT at <140 ms (Table 2).

Whereas in the group with normal $E/e'$ ratio of <15, only 6\% had a shortened DT at <140 ms. Both these
findings suggest that there is a strong correlation between an elevated E/e’ and shortened DT.

E/e’ and EF
None of the patients with an EF of >45 had an elevated E/e’ ratio. But in the patient group with a reduced EF. The E/e’ ratio was elevated at >15 in 64% of the total of 25 patients and was normal in the remaining 36% of the patients with reduced EF group (Table 3).

E/e’ and Mortality
E/e’ had a strong correlation in predicting death as an outcome of the total of 16 patients with an E/e’ ratio of >15 suggestive of elevated LV filling pressures 0.6 of these patients did not survive to hospital discharge amounting to a mortality rate of 37.5% in that group (average mortality 14%) (Table 4).

In contrast in patients who had an E/e’ ratio of <15 the mortality rate was low at 2.94%.

Thus, E/e’ was an independent predictor of hospital mortality in all patients admitted with AMI irrespective of baseline characters, risk factors and EF of the patient.

CONCLUSIONS

E/e’ Ratio
Among the three Doppler indices which reliably predicted the in-hospital outcomes in patients, E/e’ ratio was the most consistent. E/e’ reliably predicted in-hospital mortality, correlated better with the patient’s EF and also with the MV DT.

Patients with higher E/e’ ratio (>15) had an higher hospital mortality (37.5%). The hospital mortality rate was low at 3% in the patient groups with low E/e’ ratios (<15). In addition, 6 out of 7 patients who dies in the hospital had an increased E/e’ ratio (>15) and only one patient had a reduced E/e’ ratio. The E/e’ ratio also reliably predicted the EF.

None of the patients with an EF of >45% had an E/e’ ratio of >15. While in the group with an EF of <45% nearly 64% of patients had an E/e’ of >15.

This indirectly predicted that patients with elevated E/e’ (>15) had a lower EF, elevated LV filling pressures as a result of larger area of LV myocardium that has been damaged.

This is turn predicted poorer patients outcomes with greatly increased in-hospital mortality rates.

Thus, E/e’ ratio can be used as a surrogate marker of elevated LV filling pressure and hence can be reliably used as a prognostic marker to risk stratify patients admitted in coronary care units over and above other non-invasive tools already available.

REFERENCES
6. Morrow DA, Antman EM, Giugliano RP, Cairns R, Charlesworth A, Murphy SA, et al. A simple risk index for rapid initial triage of patients...


Source of Support: Nil, Conflict of Interest: None declared.
Assessment of Sentinel Nodes with Methylene Blue Dye in Carcinoma Breast is Feasible? A Pilot Study

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Abstract

Introduction: Management of axilla is an integral part of treatment of carcinoma breast. Axillary lymph node dissection has a well-established role in regional disease control and it provides information about the histopathological status which has significant prognostic and therapeutic implications.

Materials and Methods: Thirty five patients with breast cancers with stages T1-T3, N0, and one patient with T3 N1 M0 disease who had become node negative post chemo therapy were included in the study. 5 patients with breast cancer clinically node negative axilla were excluded from the study after they have found to have axillary nodes after ultrasound examination. Totally 36 patients were evaluated.

Results: This study demonstrates that sentinel node localization is possible with methylene blue dye alone with 88.88% localisation rate. Though limited by small sample size this study has shown a low false negative rate of 6.25% which denotes that SLN biopsy using methylene blue dye alone is a highly reliable and predictable technique to stage the axilla in breast cancer patients.

Conclusion: This technique may help to avoid complete axillary lymph node dissection in sentinel node negative patients thereby minimising the morbidity of axillary lymph node dissection.

Key words: Axillary dissection, Breast cancer, Methylene blue dye, Sentinel node biopsy

INTRODUCTION

Management of axilla is an integral part of the treatment of carcinoma breast. Axillary lymph node dissection has a well-established role in regional disease control and it provides information about the histopathological status which has significant prognostic and therapeutic implications. However, only around 30% of the of clinically node negative patients prove to be histopathologically node positive which means that 70% of clinically node negative patients undergo axillary dissection and are exposed to its morbidities such as neuropathies, seromas, and upper extremity lymphedema. This can be avoided with a sentinel lymph node biopsy (SLNB). Published data till date use vital blue dye and/or ⁹⁹m⁹⁹Technetium labeled colloid with gamma probe for the identification of SLNs. A combination of the two techniques has been found to be the best and is recommended for optimal outcome. Blue dye-guided SLN identification may be the only available option in countries with low resources due to the prohibitive price of gamma probes. This pilot study was done to analyze methylene blue dye uptake after peritumoral injection and to compare tumor positivity in nodes stained and unstained with blue dye in modified radical mastectomy (MRM) specimens.

MATERIALS AND METHODS

Patients of breast cancer with clinically negative axilla or patients who had pre-operative treatment (chemotherapy and/or radiotherapy [RT]) and became clinically negative axillae, irrespective of initial axillary nodal status were included in the study, after obtaining informed consent.
35 patients with breast cancers with stages T1-T3, N0, and one patient with T3 N1 M0 disease who had become node negative post chemotherapy were included in the study. Patients with breast cancer clinically node negative axilla were excluded from the study after they have found to have axillary nodes after ultrasound examination. In total, 36 patients were evaluated. Inclusion and exclusion criteria are given below:

**Inclusion Criteria**

a. Patients with carcinoma breast with clinically negative axillary nodes  
b. Patients who had pre-operative treatment (chemotherapy and/or RT) and now have clinically negative axillae, irrespective of initial axillary nodal status  
c. Patients above 18 years age with the ability to give consent.

**Exclusion Criteria**

a. Clinically palpable axillary nodes  
b. Prior upper limb lymphedema  
c. Prior breast/axillary surgery  
d. History of blue dye allergy  
e. Patients taking serotonergic drugs such as paroxetine and fluoxetine.

Comprehensive history was taken, and thorough clinical examination was done. Ultrasound examination of the axilla was done with real-time scanner with probe head of 7.5 MHz frequency transducer. Axillary lymph nodes were reported at the time of examination as abnormal on the basis of size criteria and morphology (short-axis diameter >10 mm, cortical thickening, and lobulation or loss of the normal hyperechoic hilum). The patient with abnormal axillary lymph nodes with the above-mentioned features on ultrasonogram was excluded from the study, and thus 5 patients were excluded from the study.

**Technique**

In all selected patients, MRM was done with an axilla first approach. After induction of anesthesia, peritumoral injection of 1% methylene blue dye (4 ml) at the 3, 6, 9, 12 o’clock positions was done. SLNs were looked for after raising the superior flap and opening the claviceptoral fascia, within 15 min from the time of injection. The stained nodes were removed initially and sent for histopathological examination (HPE). MRM was completed along with axillary lymph node dissection in all cases. The excised breast with the axillary tissue was sent for HPE to correlate with the findings of the SLNB (Figure 1).

**Pathological Examination**

Post-operative specimen of the primary tumor was examined under hematoxylin and eosin stain after preparing paraffin sections. Tumor grade, margin, tumor thickness, vascular invasion, lymphatic invasion, and pathological T stage were noted. Number of nodes harvested at each level and nodes positive for blue dye were separately noted. Lymph nodes were bisectioned along the long axis, and each half was separately examined after standard eosin and hematoxylin fixing and staining.

**RESULTS**

In this study, 36 patients were evaluated, with mean age of 51 years, and age range was 26-70 years. Breast cancer was the most common in the age group of 41-50 (4/36 [38.8%]) cases, followed by 51-60 years (13/36 [36.1%]) cases. In our series, left-sided lesions 19/36 (52.7%) were predominant over right sided lesions 17/36 (47.3%). The most commonly involved site was upper outer quadrant (20/36) followed by upper inner quadrant (8/36), lower outer quadrant (4/36), and central quadrant (4/36). T stage distribution includes T1 – 2/36 (5.56%), T2 – 28/36 (77.78%), and T3 – 6/36 (16.67%) (Table 1).

Sentinel node was successfully identified in 32/36 (88.89%). Among the 32 cases, there was skip metastases to Level II node in one patient. SLN was not identified in 4 cases 4/36 (11.11%). There was only one patient with node-negative axilla post-neoadjuvant chemotherapy. In that patient, also sentinel node was identified. When the histopathological status of axillary lymph nodes was compared to SLNs histopathology, it was seen that when sentinel node HPE was positive (16/32) cases, the rest of the axilla was positive in 3 cases and negative in 13 cases and when the sentinel node HPE was negative (16/32) cases,

<table>
<thead>
<tr>
<th>Table 1: General characteristics</th>
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<tr>
<td>General patient characteristics</td>
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<tr>
<td>Age distribution: 26-70 (mean 43 years)</td>
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<td>&lt;50 years</td>
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<td>50 years and above</td>
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<td>Right</td>
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<td>T1</td>
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<td>T2</td>
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<td>T3</td>
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<td>Site</td>
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<tr>
<td>Central</td>
</tr>
<tr>
<td>Grade</td>
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<tr>
<td>LOQ</td>
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<td>Grade 1</td>
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the rest of the axilla was also negative in 15 cases except one case. The sensitivity, specificity, positive predictive value, and negative predictive values were 66.67%, 51.5%, 12.5%, and 93.75%, respectively (Table 2).

In this study, we have dissected 867 axillary lymph nodes and total no of blue nodes harvested 80 and non-blue nodes 787. Average sentinel node harvest was 2.22. When analyzing the factors affecting the nodal positivity, we found that <50 years of age, 56.25%, left sided 43.75% upper outer quadrant 37.5%. Grade 2, 62.5%, was associated with sentinel node histopathology positivity, but none of these factors except the grade were statistically significant. Lower the grade higher was the sentinel node identification rate (Table 3).

**DISCUSSION**

The status of axillary lymph node remains the most important predictor of survival in women with invasive breast cancer, and this is used for making treatment decision. Various methods of predicting axillary lymph node status have been described including clinical assessment, radiological, and operative procedures. Axillary lymph node dissection was earlier considered to be the gold standard for predicting the axillary lymph node status. Axillary lymph node dissection may be associated with significant morbidity such as post-operative pain in arm, chronic lymphedema of involved arm, neuropathy of arm, seroma formation, restricted shoulder mobility, and other complications. SLNB has emerged as an effective diagnostic tool in staging axillary disease. The major advantage of SLNB is the lower complication rate compared with axillary lymph node dissection.

This study was conducted to assess the feasibility of SLN localization using methylene blue dye alone. 36 patients were included whose axilla was clinically negative for lymphadenopathy. 35 patients were subjected to primary surgery and one patient was treated with neoadjuvant chemotherapy and subsequently became node negative. Although number of patients included was small (N = 36), it was comparable to studies done by Krag et al. (N = 22), Borgstein et al. (N = 33), Pijpers et al. (N = 34), Ikeda et al. (N = 29), Motta et al. (N = 54), and Bassi et al. (N = 40). 36 patients were evaluated with a median age of 51, and the study group was similar to what is reported in literature.

Sentinel node identification was higher in the age group of <50 years. Patient age was inversely correlated with the ability to identify the SLN. This finding has been reported previously and may be related to the inability of the blue dye to be taken up by the lymphatic system when injected into the fat-replaced postmenopausal breast. Özdemir et al. studied 32 patients with a median age of 50. Mukherjee et al. evaluated 27 patients with a median age of 43.

### Table 2: Sentinel node histopathology positivity versus rest of axillary lymph node histopathology positivity

<table>
<thead>
<tr>
<th>Histopathology of the SLN</th>
<th>Histopathology of the rest of the axillary node</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
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<tr>
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<td>0.5442</td>
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Table 3: Factors affecting sentinel node identification

<table>
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<tr>
<th>General patient characteristics</th>
<th>Sentinel node-identified</th>
<th>Sentinel node not identified</th>
<th>Total</th>
<th>P value</th>
</tr>
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<td>18</td>
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<tr>
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<td>17</td>
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<tr>
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<td>20</td>
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<td>1</td>
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<td>Central</td>
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<td>LOQ</td>
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<tr>
<td>3</td>
<td>7</td>
<td>2</td>
<td>9</td>
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</tbody>
</table>

UOQ: Upper outer quadrant, UIO: Upper inner quadrant, LOQ: lower outer quadrant

Figure 1: The methylene blue dye stained sentinel node
In this study, both right and left sides were more or less equally affected with slight predominance of left-sided lesions (19/36). Upper outer quadrant was involved in 20/36 (55.6%) of cases followed by upper inner quadrant 8/36 (22.2%), central quadrant 4/36 (11%), and lower outer quadrant (4/36). Sentinel node was identified readily in the upper outer quadrant tumors 95% followed by upper inner, central and lower outer quadrant locations with similar identification rate of 75%.

Right side (72%) and upper outer quadrant (75%) were the most common side and site of tumor location in a study by Ozdemir et al. 2013. In the study by Mukherjee et al., upper outer quadrant 44% was the most common site of tumor. Clinical tumor status include T1 2/36 (5.6%), T2 28/36 (77.8%) and T3 6/36 (16.7%) and Grade I - 8/36 (22.2%), Grade II - 19/36 (52.8%), Grade III - 9/36 (25%) with highest sentinel node identification in T3 and Grade I lesions about 100%. In this study, clinical characteristics did not affect sentinel node identification except tumor grade and it is similar to the results observed by Nano et al.12 who studied clinical and histological factors associated with sentinel node identification.

Either isosulfane blue or methylene blue can be used as a dye in SLNB. Methylene blue is cheaper, more easily obtainable, and is a dye with fewer complications as compared to isosulfane blue. Hypersensitivity reactions which may also be fatal are reported at a rate of 0.6-2.5% following isosulfane blue injection. Skin necrosis, if injected intradermally, fat necrosis, and fibrosis over the injection site are among complications of methylene blue. However, in this study, no such complications related to methylene blue were encountered. In studies conducted in our country isosulfane blue was often preferred.13 In the literature, there are many studies showing that methylene blue can be used safely and with high success as an alternative to isosulfane blue. Simmons et al.14 have identified the SLN in 104 of 112 patients by using methylene blue and reported that SLN represented axillary status in 96.9% of patients. Blessing et al.15 compared isosulfane blue and methylene blue and found the accuracy rate as 88.5% with isosulfane blue and as 92.7% with methylene blue.

In this study, also sentinel node identification with blue dye alone was 88.88%. In comparison, other studies which have reported sentinel node identification with methylene blue dye alone, ranging from 65% to 94% (Blessing et al. Simmons et al., Nour, 2006),16 slightly improved rates with combination of both radioactive colloid and blue dye (94-100%).

In this study, we dissected 867 axillary lymph nodes from 36 patients and subjected for HPE for evidence of metastasis. We could identify 80 blue stained SLN during the procedure with average of 2.2 sentinel node. This finding is in conjunction with identification rates of several authors such as Giuliano et al.17 (1.8), Motomura et al.18 (1.8), Csernii19 (1.3), Cox et al.20 (1.92), Hill et al.21 (2.1), Ikeda et al.22 (1.95), and Albertini et al.22 (2) Increasing the mean number of SNs removed may improve accuracy.

In this study of 36 cases, the SLN detection rate was over 88.8%, and the negative predictive value was 93.75%. The rate of false-negative result best defines the accuracy of SLNB. In this study, false-negative result was seen in one patient (6.25%). This is comparable with those of other published studies by Blessing et al., Simmons et al., Nour, 2006.14,16

Only one patient was post neoadjuvant chemotherapy in this study. She initially had T3 N1M0 disease and became node negative after three cycles of neoadjuvant chemotherapy with 5-fluorouracil, Adriamycin and cyclophosphamide (after chemotherapy became node negative). In that patient, we could identify the sentinel node and could accurately predict the axillary status, as both sentinel nodes and rest of the axillary nodes were positive for malignancy.

Our results indicate that SLNB can reliably predict the axilla status such that when sentinel node is negative for metastases, axillary dissection can be safely omitted.

A recent survey on SLNB distributed by American Society of Breast Diseases Rapid Response Panel demonstrates that SLNB is considered to be the standard of care by 85% of the members who responded. It has been suggested that surgeons should demonstrate an SLN identification rate of more than or equal to 90% and a false negative rate of less than 5% before they offer SLNB without completion axillary dissection.23 However, before SLNB becomes the undisputed standard of care, randomized trials will have to show no difference in axillary recurrence, and overall survival between SLNB alone and SLNB followed by axillary dissection in patients with negative sentinel node(s). Blue dye along with Tc99m mapping theoretically increases the accuracy of test but from various validation studies it is clear that blue dye technique alone can be used when Tc99m mapping facility is not available. Our study demonstrates that sentinel node localization is possible with methylene blue dye alone. Although limited by a small sample size, this study has shown a low false negative rate of 6.25% which denotes that SLNB using methylene blue dye alone is a highly reliable and predictable technique to stage the axilla in breast cancer patients. This technique may help to avoid complete axillary lymph node dissection in sentinel node negative patients thereby minimizing the morbidity of axillary lymph node dissection.
REFERENCES

A Prospective Survival Analysis in Locally Advanced Carcinoma Cervix Patients Following Concurrent Chemoradiation with Weekly Cisplatin

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Abstract

Introduction: Cervical cancer is one of the most common cancers diagnosed in female patients in developing countries. Successful treatment leading to cure is the major concern for most patients.

Aim: This study aims to analyze the tumor response, the disease-free and overall survival rate in patients with locally advanced carcinoma cervix.

Materials and Methods: Prospective cohort study was conducted in patients with confirmed carcinoma cervix. Disease-free survival is analyzed from date of registration to local or distant relapse or death or last visit.

Results: 35 (77.8%) patients received only 4 cycles of concurrent chemotherapy, and 10 (22.2%) received 5 cycles of concurrent chemotherapy. Only 8 (17.8%) patients developed recurrence, 37 (82.2%) patients not developed recurrence. Disease-free survival after 1 year is 82%. Only 1 (2.2%) patient died, the cause of death being renal failure. The overall survival after 1 year is 98%.

Conclusion: Concurrent chemoradiation treatment is an effective treatment for patients with locally advanced cervical cancer. There are many prognostic factors influencing treatment outcome.

Key words: Cervical cancer, Radiation therapy, Survival rate

INTRODUCTION

Cervical cancer is the second most common cancer in women worldwide and a major cause of death particularly in developing countries.¹ The global yearly incidence of cervical cancer in 2012 was 528,000; the annual death rate was 266,000.² The incidence of cervical cancer per 1 lakh women in India is 30.7. Incidence varies worldwide with the highest rates found in Latin America and the lowest among Jewish women in Israel. Poor nutritional status, multiple sexual partners, first coitus in young age, early childbirth, promiscuity of the spouse, human papillomavirus infections, sexually transmitted diseases, and immunocompromised states are cited as main risk factors.³ The use of cervical screening has greatly reduced the incidence of invasive cervical cancer in the western countries, but it continues to be a major cause of cancer mortality in the rest of the world because the majority of patients have locally advanced disease at presentation. In developing or less developed countries, over 80% of women with cervical cancer are diagnosed at advanced stage which is associated with poor prognosis.⁴ Radiation therapy (RT) alone was being used as a primary treatment for patients with locally advanced - the International Federation of Gynecology and Obstetrics (FIGO)⁵ Stage IIB to IVA - cervical cancer. In 50% of cases, it failed both locally and distantly, suggesting the need of additional therapeutic modalities.⁶ Many studies suggest that inclusion
of chemotherapy with radiation will increase the effect of radiation. Prognosis depends on disease stage (FIGO), tumor volume, the presence of involved lymph nodes, delivered radiation dose, treatment duration, hemoglobin level, and optimum use of intracavitary brachytherapy. Several randomized trials in 1990 compared the effects of cisplatin along with radiation to radiation alone. The results of these studies show that concurrent chemoradiation lowers the risk of recurrence and death. Squamous cell carcinoma account for 80% of all cervical cancers, and adenocarcinoma constitutes approximately 20%.

**Aim**
This study aims to analyze the tumor response, the disease-free and overall survival rate in patients with locally advanced carcinoma cervix.

**MATERIALS AND METHODS**
This prospective cohort study was conducted in Department of Radiotherapy, Government Medical College, Thrissur.

**Inclusion Criteria**
Newly diagnosed patients with histologically confirmed carcinoma cervix, patients with FIGO Stage IIB to IVA, and no evidence of distant metastasis. Gynecological oncologic group performance status of 0-3, age <70 years, white blood cells (WBC) count >4000 cells/ml, an absolute neutrophil count >37.5%, platelet count of 100000 platelets/ml, serum creatinine <1.5 mg/dl, creatinine clearance more than 80 ml/min, and hemoglobin value >8 g%.

**Exclusion Criteria**
Carcinoma cervix FIGO Stage IA-IIA, history of renal disease, coronary artery diseases, uncontrolled hypertension, the presence of distant metastasis, age more than 70 years, WBC count <4000 cells/ml, an absolute neutrophil count <37.5%, platelet count <100,000 cells/ml, serum creatinine >1.5, creatinine clearance <80 ml/min, and hemoglobin value <8 g%.

A thorough clinical examination was performed including per speculum examination, per vaginal (PV) examination, digital rectal examination, and per abdominal examination. In all patients, investigations such as chest X-ray, ultrasonography abdomen, magnetic resonance imaging (MRI), complete blood count, renal function test, liver function test, and urine analysis were done. Cystoscopy and sigmoidoscopy were performed only in patients clinically suspicious of bowel and bladder invasion. Tumor size was examined clinically by two different examiners before, and following the treatment, after the treatment MRI scan of abdomen and pelvis will be repeated. Disease-free survival is analyzed from date of registration to local or distant relapse or death or last visit.

**External Beam Radiotherapy**
All patients were irradiated by external beam radiation with megavoltage beams on telecobalt machine with a total dose of 45 Gy given in 23 fractions of 1.95 Gy per fraction, 5 fractions per week starting 1st day of the first chemotherapy. The upper border of the individualized treatment beam is at the lower margin of L4 to include distal common iliac nodes. The inferior border is 3 cm below the most inferior disease in the vagina as palpated or seen on MRI. Lateral borders are 2 cm outside the bony pelvic sidewalls. The anterior border must encompass the GTV-T as well as the common iliac nodes and is usually placed through the anterior third of the symphysis pubis. The posterior border is 2 cm from the GTV-T including the posterior extension of tumor, uterosacral ligaments, and upper presacral nodes and is commonly situated 0.5 cm posterior to the anterior border of the S2/3 vertebral junction.

**Chemotherapy**
All patients received weekly cisplatin 40 mg/m² given intravenously starting on day one of radiation. Premedication consisted of dexamethasone 8 mg IV, and a 5-HT3 receptor antagonist as antiemetic with hydration with 1000 ml NS followed by mannitol 20 g followed by cisplatin in 500 ml normal saline followed by injection calcium gluconate 1 ampule in 500 ml normal saline followed 500 ml ringer lactate. Antiemetic prophylaxis will be continued with 5-HT3 receptor antagonist orally for 3 days after each cycle of chemotherapy.

**Brachytherapy**
After completion of the external beam therapy, all patients were subjected to high-dose rate brachytherapy, with dosage of 7 Gy to point A in three sittings (one sitting/week) were given for patients with minimal residual disease after external beam radiation and 8 Gy to point A in two sittings were given for those with no residual after external beam radiation. Brachytherapy was planned 1 week after external beam radiation.

The regimen was administered on outpatient basis. All patients were monitored closely weekly during the course of concurrent chemoradiation for assessing the toxicity of therapy. Toxicity grading was done according to the RT Oncology Group grading.

**Treatment Monitoring and Follow-up**
The patients require to follow-up at 6 weeks from completion of therapy to assess response, toxicity, and disease status. Subsequent follow-up visits scheduled at
monthly up to 1 year. At follow-up, patients undergo thorough clinical examination for detection of locoregional disease. Patients who drop out or do not complete planned course of treatment will be excluded.

**RESULTS**

45 patients satisfied the inclusion criteria and were taken up for the study with their consent. The mean age of the study population was 57 years, ranging from 35 to 70 years. 20 patients (44.1%) are in the age group of 61-70 years old. 11 patients (24.1%) are below the age of 50 years, 14 patients (31.1%) are the age group of 51-60 years. Of the 45 patients, 34 (75.6%) are homemaker and 11 (24.4%) are manual labor. 24 patients (53.3%) were below poverty line, and 21 patients (46.7%) were above poverty line. Bleeding PV and discharge PV was present in 38 (84.4%) patients; pain was present in 25 (55.6%) of patients. 11 (24.4%) patients have habit of tobacco chewing. No one has smoking and alcohol habits. 22 (48.9%) patients out of 45 have ECOG 0, and 23 (51.1%) patients have ECOG 1. 20 (44.4%) patients have vaginal involvement, 25 (55.6%) patients do not have vaginal involvement. 21 (46.7%) patient have 4 cm size lesion, 13 (28.9%) have 5 cm lesion, 5 (11.1%) have 6 cm lesion, 3 (6.7%) have 3 cm lesion, 2 (4.4%) have 5.5 cm lesion, and 1 (2.2%) has 2.8 cm lesion. 7 (15.6%) have adjacent structure involvement, 38 (84.4%) patient not have adjacent structure involvement. 26 (57.8%) patients have initial stage of 2B, 13 (28.9%) have 3B, 5 (11.1%) have 4A, and only 1 (2.2%) has 3A stage. 35 (77.8%) patients received only 4 cycles of concurrent chemotherapy, and 10 (22.2%) received 5 cycles of concurrent chemotherapy. Only 8 (17.8%) patients developed recurrence, 37 (82.2%) patients not developed recurrence (Table 1).

37 (82.2%) patients did not develop recurrence of disease, 6 (13.3%) developed recurrence in the cervix, 1 (2.2%) developed recurrence in the bladder, and 1 (2.2%) developed recurrence in the brain (Table 2).

After a follow-up period of 1 year, 6 (13.3%) patients developed recurrence in the cervix, 1 (2.2%) patient developed brain metastasis, and 1 (2.2%) patient developed bladder recurrence. No recurrence was seen in 37 (82.2%). Hence, disease-free survival after 1 year is 82%.

Only 1 (2.2%) patient developed distant metastasis, 44 (97.8%) patients not developed distant metastasis (Table 3).

Only 1 (2.2%) patient died, the cause of death being renal failure. The remaining 44 (97.8%) patients are alive. Only one patient died out of 45 patients. The overall survival after 1 year is 98% (Table 4).

Analysis using paired t-test shows there is a significant reduction in the size of the tumor after concurrent chemoradiation irrespective of the recurrence status (Table 5).

Only one patient had metastasis, and she developed recurrence. Death occurred in only one case. She had bleeding PV, discharge, and pain. No comorbidities and no substance abuse were observed. The adjacent structure was involved and the stage was 4A. 4 cycles of concurrent chemotherapy were given. Death was due to renal failure.

**DISCUSSION**

In the present study, 26 (57.8%) patients were Stage 2B, 1 (2.2%) patient was Stage 3A, 13 (28.9%) patients were

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<tr>
<th>Table 1: Recurrence</th>
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<tr>
<td>Response</td>
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<tr>
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<th>Table 2: Site of recurrence</th>
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<td>Bladder</td>
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<tr>
<td>Brain</td>
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<th>Table 3: Metastasis</th>
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<th>Table 5: Comparison of tumor size before and after treatment between groups with or without recurrence</th>
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<td>Present</td>
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<td>Absent</td>
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Stage 3B and 5 (11.1%) patients were Stage 4A. Out of these, 2 (7.7%) patients in Stage 2B, 2 (15.4%) patients in Stage 3B, and 4 (80.0%) patients in Stage 4A developed recurrence. Treatment was well tolerated. The overall survival after 1 year in this study group is 98%. Only one patient died. The patient had recurrence and the cause of death was renal failure. The disease-free survival in this study group was 82% after 1 year (Figure 1). 8 patients developed recurrence (7 developed local recurrence and one had distant metastasis). Cervix was the most common site of recurrence and brain was the site of distant metastasis. There was significant reduction of the size of the tumor after concurrent chemoradiation. In the study by Verma et al., the overall survival at 10.4 months is 68.8%. In the study by Gleara et al., the overall survival after 2 years was 78%. In a study by Donnelly et al., the disease-free survival was 69% at 5 years. Study by Kim et al. showed an overall survival of 67% at 4 years (Table 6).

CONCLUSION

Concurrent chemo-RT is an effective treatment for patients with Stage IIB to Stage IVA cervical cancer. There are many prognostic factors influencing treatment outcome. Chemotherapy must be added in appropriate patients to improve the outcome. Future prospective trials should be undertaken to confirm the validity of these factors and to individualize the treatment strategy for every patient.

REFERENCES


Efficacy of Manual Small Incision Cataract Surgery at the Base Hospital at Tertiary Level in West Bengal

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Abstract

Introduction: Cataract has been documented as a leading cause of blindness in India where vision <3/60 in the better eye on presentation is defined as blindness.

Materials and Methods: A prospective observational study was conducted where consecutive cataract patients were recruited during a period of 1 year. Cataract surgeries were performed in uncomplicated cases after selection in screening camps by manual small incision cataract surgery technique with posterior chamber intraocular lens implantation. Postoperatively patients were treated with antibiotic-steroid eye drops for 6 weeks in tapering dose, homatropine 2% eye drops twice for 2 weeks, oral ciprofloxacin 500 bid for 5 days, and analgesic tablet with antacid for 3 days. All patients were followed up on 2nd post-operative day, 1 week, and at 6th week. Spectacles were prescribed at 6 weeks after retinoscopy.

Results: Out of 228 patients, 99 (43.42%) patients were male, and 129 (56.57%) female; 162 (71.05%) were above the age of 60 years, 66 (28.94%) were between 40 and 60 years; 148 (64.91%) patients had senile immature cataract and 80 (35.08%) had senile mature cataract. Post-operative unaided visual acuity was 6/12 (Snellen’s chart) or better by 6th week in 176 (77.19%) cases. Best-corrected visual acuity of 6/12 to 6/9 and even better by the 6th week was found in 213 (93.42%) cases, and the remaining 15 (6.61%) cases had low vision ≤6/18.

Conclusion: There was the good visual outcome in hospital based large volume cataract surgery with the average astigmatism of 2.00 D. This can be opted as the method of choice on large scale surgery in developing countries.

Key words: Hospital based cataract surgery, Manual small incision cataract surgery, Visual outcome

INTRODUCTION

Cataract has been documented as a leading cause of blindness in India where vision <3/60 in the better eye on presentation is defined as blindness. It was estimated that 314 million people were visually impaired worldwide; and 39.1% of the global blindness was due to cataract.¹² The survey conducted by the World Health Organization (WHO) revealed that the worldwide blindness caused by cataract comprises 47.8% and in the South East Asia including India contributed 51% blindness due to cataract.³ Approximately 4 million people are blind because of cataract annually adding to the backlog of cataracts in our country, and only 5 million cataract surgeries are performed annually in the country.⁴ With the improved quality of life, health indices, and the increased life expectancy, there is an increase in a number of cataract patients. The only remedy is to perform hospital based cataract surgery on a large scale. The earlier studies conducted in India reported that extracapsular cataract extraction (ECCE) by manual small incision cataract surgery (SICS) which involves the removal of nucleus through a scleral tunnel through 5.5-8 mm incision with posterior chamber intraocular lens (IOLs) implantation is the best rehabilitation of patients with cataract.⁵⁶ Owing to complex mechanism

Access this month online

www.ijss-sn.com

Month of Submission: 02-2017
Month of Peer Review: 03-2017
Month of Acceptance: 03-2017
Month of Publishing: 04-2017

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and less cost-effectiveness of phacoemulsification, its use is limited and not practiced widely in cases of the large volume of surgeries. More recently, the WHO global initiatives have called for a dramatic increase in surgical volumes worldwide. Due to the variable outcome of cataract surgery, the aspect of surgical services needs further evaluation. In majority part of the world’s eye surgery in camps is not practiced owing to lack of safety of the procedure, higher incidence of intraoperative complications during cataract surgery may result in severe visual loss, and thus, there is a debate on the continuation of surgery in camps. In recent times, surgery on a mass scale in camp is discouraged and replaced by screening camp in mass level and surgery in well-equipped hospital based modern operation theater under strict guidelines made by Ministry of Health, Government of India under National Programme for Control of Blindness. This study was to report the outcomes of cataract screening camps combined with base hospital surgery, in terms of visual outcome.

MATERIALS AND METHODS

A prospective observational study where consecutive cataract patients were recruited during a period of 1 year from April 2014 to March 2015. The eye screening camp for cataract was conducted in the suburban area of Kolkata. Ethics approval was obtained from the Institutional Ethics Committee of a Tertiary Hospital of West Bengal before the commencement of the study. Informed consent was taken from all the diagnosed cases. A total of 228 patients were selected using the inclusion and exclusion criteria that explained in one of the following sections.

Inclusion and Exclusion Criteria

The study has included the patients agreeing to cataract surgery using the SICS procedure and aged above or equal to 40 years. The study excluded the patients who had a complicated cataract, traumatic cataract, uveitis cataract, and other ocular comorbidities which may affect the visual outcome.

Ophthalmic Examination

The detailed medical history was obtained for hypertension, asthma, ischemic heart disease, and diabetes mellitus. Detailed demographic information, pre-operative visual acuity assessment, anterior segment evaluation using slit lamp biomicroscopy, intraocular pressure measurement by Goldman applanation tonometer, biometry. Fundus examination by 90D, direct ophthalmoscopy, and indirect ophthalmoscopy were done before surgery.

All patients underwent ECCE with posterior chamber IOLs in the capsular bag by manual SICS technique under peribulbar anesthesia. All patients were operated by ophthalmic consultants. In the case of nuclear sclerosis Grade V and hard cataract, the tunnel was extended. Subconjunctival injection of dexamethasone and gentamicin (80 mg/2 ml) was given. Postoperatively all patients received oral antibiotic (tablet ciprofloxacin 500 mg for 5 days with tablet ibuprofen 400 mg for 3 days) and topical antibiotic-steroid (moxifloxacin with prednisolone acetate) eye drops for 6 weeks in tapering dose along with homatropine 2% eye drops for 2 weeks was advised. The follow-up post-operative schedule was on day 1, 1st week and 6th week to check for best-corrected visual acuity (BCVA) and post-operative complications if any. Every visit slit lamp and fundus finding were recorded in addition to visual acuity. Refractive status was checked on every visit using Streak Retinoscope. Spectacle correction was given at the end of 6th week. Unaided and pinhole visual acuity was recorded using the Snellen’s chart from a distance of 6 m. Patients were discharged after 24 h with counseling for post-operative care and follow-up following routine procedures.

RESULTS

All 228 patients underwent ECCE with SICS technique with posterior chamber IOLs implantation under local anesthesia by different consultants. The age of the patient was between 40 and 82 years. Table 1 and Figure 1 shows various demographic profile of the patient as follow:

- The sex distribution of the patients showed 99 (43.42%) male and 129 (56.57%) females
- Age wise distribution depicted 162 (71.05%) were above 60 years and 66 (28.94%) were between 40 and 60 years of age
- 148 (64.91%) patients had senile immature cataract, and 80 (35.08%) were senile mature cataract
- Pre-operative visual acuity in 131 (57.45%) had vision counting finger 3 m or even less, 33 (14.47%) had hand movement, 64 (28.04%) had a perception of light only.

Table 2 shows post-operative unaided visual acuity was 6/12 (Snellen’s chart) or better by 6th week in 176 (77.19%) cases. Figure 2 shows BCVA of 6/12 to 6/9 and even better by the 6th week in 213 (93.42%) cases and remaining 15 (6.61%) cases having low vision (visual acuity ≤6/18) was mainly attributed to age-related macular changes, myopic fundus, and optic atrophy.

DISCUSSION

The study was conducted in a series of cases to find the visual outcome selected from outreach screening camps with an aim to find out the visual outcome after hospital based camp surgery. With a schedule of follow-up on
2nd day, 1st week, and 6th week, BCVA in better eye was found to be 6/12-6/9 in 213 (93.42%) cases which are similar and corroborative to earlier studies of Sudhakar et al.,10 who reported a visual acuity of 6/12 or better in 80.7% of cases and Venkatesh et al.,11 Ravindra and Rekha,12 and Kapoor et al.13 observed and reported a visual acuity of 6/12 or better in 80.7% and 6/18 or better in 80.7% cases, and 79.9% eyes obtained 6/18 or better, respectively. The study results by Venkatesh et al.11 showed that the high quality cataract surgery (94% BCVA 6/18 or better) can be attained in a high volume setting which is very much similar to our study, which depends on choice of surgical technique, standardized protocols and an above all, facilities available in terms of manpower, availability of high quality consumables supporting high turnover and flow of patients. In our study, postoperative astigmatism was 2.0 D with manual SICS with posterior chamber IOLs implantation and it was high compared with the average astigmatism of 0.5 D in the phaco and 1.50 D in the manual SICS reported by Gogate et al.6 study. The main limitation of this study was that we could not compare the cause for BCVA <6/12 with other studies, as postoperatively follow-up was for 1½ month in small sample size. The study would have given more observation if it had a long duration follow-up.

CONCLUSION

Conclusively it can be said that there is the good visual outcome in hospital based large volume cataract surgery with the average astigmatism of 2.00 D. However, it requires much larger sample size with long-term follow-up.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Clinico-etiological Study of Tinea Corporis: Emergence of *Trichophyton mentagrophytes*

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Abstract

**Background:** Tinea corporis is a superficial fungal infection of the glabrous skin of the trunk and extremities caused by closely related organisms of the three genera – *Trichophyton*, *Microsporum*, and *Epidermophyton*, collectively known as dermatophytes. The prevalence of the different species varies according to geographic and climatic regions. *Trichophyton rubrum* has been reported from various worldwide (up to 80%) and Indian studies (up to 88%) as the most common causative organism of tinea corporis.

**Aim:** The aim of the study was to study the clinico-etiological profile of tinea corporis in a tertiary care center.

**Materials and Methods:** A total of 74 patients clinically diagnosed with tinea corporis fulfilling the inclusion criteria were recruited into the study. A detailed clinical history was obtained, and clinical examination was done and documented. Scrapings from the active margins of the skin lesions were taken for potassium hydroxide (KOH) mount and fungal culture on Saboraud’s dextrose agar.

**Results:** KOH microscopy was positive in 91.9% of patients. The sensitivity of KOH microscopy in the study was 94.2% and specificity was 40% with a positive predictive value of 95.6% and a negative predictive value of 33.3%. Fungal growth was observed in 74.3% of the samples cultured. *Trichophyton mentagrophytes* was the most common dermatophyte isolated (64%) followed by *Trichophyton tonsurans* (20%) and *T. rubrum* (12%).

**Conclusion:** *T. rubrum* only accounted for 12% of cases in this study. *T. mentagrophytes* was the most common pathogen isolated which has not been previously reported from our geographical location, and only very few reports from other parts of the world. The emergence of this organism warrants a renewed look into the antifungal susceptibility patterns for combating this common superficial fungal infection efficiently.

**Key words:** Dermatophytes, Fungal culture, Fungal skin infection, Potassium hydroxide mount, Tinea corporis, *Trichophyton mentagrophytes*, *Trichophyton rubrum*

INTRODUCTION

Superficial fungal skin infections are quite common and affect millions of people the world over. Dermatophytes are the most common causative agents of these superficial fungal infections with an estimated 10-20% lifetime risk of acquiring one.¹ It is indeed possible that almost every human being, belonging to any race or geographical location, during the course of his or her lifetime will be infected by dermatophytes at some point.²,³ Dermatophytes are a group of closely related fungi belonging to three different genera (*Trichophyton*, *Microsporum*, and *Epidermophyton*) that produce a skin infection, in humans and other animals, termed dermatophytosis, commonly referred to as “Ringworm” or “Tinea.”⁴,⁵ These species are further classified as geophilic, zoophilic, or anthropophilic based on whether they predominantly reside in the soil, on animals, or on humans, respectively.⁶ There is significant variability in the incidence and distribution of these fungal infections worldwide as the prevalence of the different species varies with geographic regions, climatic conditions, local cultural
practices, and socioeconomic conditions. Areas with high humidity, overcrowding, and poor hygienic conditions are the predisposing factors for dermatophytosis making it one of the major public health problems in many countries.

The dermatophyte infection of the glabrous skin of the trunk and extremities is termed tinea corporis and can be caused by any of the dermatophytes though most frequently attributed to the prevailing fungi of that particular region. It is the most common dermatophyte infection in India and abroad. Clinically presents with single or multiple, confluent, annular and polycyclic plaques with varied inflammatory responses. Milder lesions show peripheral scaling and minimal erythema while highly inflammatory lesions show pustular margins and marked erythema. Trichophyton rubrum is responsible for up to 80% of cases of tinea corporis worldwide while in India it is accountable for up to 88% of cases followed by Trichophyton mentagrophytes (up to 35% of cases). Trichophyton schoenleinii is associated with 14% of tinea corporis infections worldwide and in India, making it the third most common causative organism, followed by Epidermophyton floccosum (up to 8%).

Recent studies have shown that there has been a significant change in the worldwide distribution of these dermatophytes over the century, due to constant competition for their specific environment, leading to emergence of the predominant species and displacement of the others. These changes are ascertained by laboratory cultures of infected cutaneous tissues collected continuously, and the data used to compare the past and present trends, to predict increasing antifungal resistance and the need for newer drugs.

The diagnosis of tinea corporis is mostly clinical though it is prudent and occasionally essential to involve laboratory testing which includes direct microscopy of the specimen in 10% potassium hydroxide (KOH) solution and fungal culture in Sabouraud's dextrose agar (SDA) medium. In experienced hands, KOH microscopy has been widely advocated to be more sensitive and reliable than fungal cultures for demonstrating dermatophytes as culture techniques have a limited role because of the expense and time involved. Given the nature of species variability region-wise, and the recent rise in antifungal resistance observed clinically, this study was undertaken to identify the clinico-etiological profile of tinea corporis.

MATERIALS AND METHODS

This study was conducted in the Department of Dermatology, Pondicherry Institute of Medical Sciences, Pondicherry, India. A total of 74 patients clinically diagnosed with tinea corporis and fulfilling the inclusion criteria were taken into the study. Patients under 16 years of age and those who had undertaken any topical or systemic antifungal therapy in the past 2 months at the time of presentation were excluded from the study. A detailed clinical history was taken and physical examination done in all the cases, and the data were entered in a proforma. The infected lesions were scraped to obtain specimens to confirm the presence of fungal infection by microscopic examination and culture. The lesions were thoroughly cleaned free of any debris by using 70% alcohol to reduce bacterial contamination. The area was then allowed to dry thoroughly. Scrapings of the skin were taken with a no. 15 sterile surgical blade held vertically to the skin from the edge of the lesions. Scrapings were collected directly onto the slide for KOH-microscopy and onto a sterile folded paper (which kept the specimen dry) placed inside a sterile glass container, for transport to the microbiology lab for culture. For KOH microscopy, a drop of 10% KOH was added to the sample collected on the slide. A cover slip was applied with gentle pressure to drain away excess KOH. The slides were kept at room temperature for 20 min for clearing of the keratin. Slides were then examined microscopically at 400× magnification. The test was considered positive when long, branching, septate, hyaline hyphae were present.

For fungal culture, the scales obtained in the sterile container were transferred into a set of 4 screw-capped tubes, two containing SDA and two with Emmon's modified SDA, and sealed with parafilm. One of each was incubated at 25°C and 37°C. Observation for growth was done every week for a total of 6 weeks. If growth was observed, a lacto-phenol cotton blue (LPCB) preparation was done from the culture for species identification. The species identification was done by growth characteristics on the culture media, the reverse of the colonies, conidial morphology, arrangement, and biochemical tests such as growth on urease medium and cornmeal agar. If the species could not be identified, then a microslide culture was done from that culture specimen using a square block of agar on a glass slide and incubated at 25°C. After growth on slide culture, the agar was removed, and the coverslip was examined microscopically after staining with LPCB, and the species of dermatophyte was identified. Cultures that did not show any growth at the end of 6 weeks were considered negative.

OBSERVATIONS AND RESULTS

Out of the 74 patients included in the study, 42 were male (56.76%) and 32 were female (43.24%). The age-group and gender-wise distribution of the patients are shown in Figure 1. In this study, of the 74 patients diagnosed with tinea corporis, 32 patients were found to have associated...
tinea cruris (43.24%), 3 patients with tinea faciei (4.05%) and 3 others with tinea unguium (4.05%).

KOH microscopy was positive in 68 (91.90%) of the patients while only 55 (74.30%) patients showed growth on fungal culture. Of the 68 patients with positive KOH findings, 17 patients (22.97%) had a negative culture and of the 6 patients who had a negative KOH, 4 patients (5.40%) had a positive culture. KOH microscopy and culture were both positive in 51 patients (68.92%) and both negative in 2 patients (2.70%). The sensitivity of KOH in the study was calculated to be 94.20% and specificity as 40.00% with a positive predictive value of 95.59% and a negative predictive value of 33.33%.

On fungal culture, as depicted in Figure 2, *T. mentagrophytes* was the most common organism isolated (32 samples, 43.24%) followed by *Trichophyton tonsurans* in 10 samples (13.51%), *T. rubrum* was grown in 6 (8.11%) samples and *E. floccosum* in 2 (2.70%). Four (5.48%) cultures grew Candida spp., 1 (1.35%) grew Cladosporium spp. and 19 samples (25.68%) did not show any growth. Of the dermatophytes cultured, *Trichophyton* spp. constituted 96% (48 out of 50 samples) and *T. mentagrophytes*, 32 out of 50 samples, was the most common dermatophyte isolated (64%) followed by *T. tonsurans* (20%). *T. rubrum* accounted for 12% and *E. floccosum* for 4%. *Microsporum* spp. was not isolated from any of the patients who were included in this study. The mycological pattern of dermatophytes isolated in the study is depicted in Figure 3. The culture characteristics and fungal identification of *Trichophyton mentagrophytes* are depicted in Figures 4a, b and 5 respectively.

**DISCUSSION**

This study showed that the majority of the patients with tinea corporis were in the age group 21-40 (48.65%) which is similar to findings reported in other studies. This could be due to the fact that this is the group of the population indulging in greater physical activity, such as agriculture, outdoor activities, and sports that leads to increased sweating and therefore predispose to the disease. The study showed an overall predominance of tinea corporis in males (56.76%). This is in concordance with studies...
reported both from India and abroad. The lower incidence in females could also be due to non-reporting of females in the 16-30 age groups due to the prevailing social stigma in the rural community. However, it was interesting to note that tinea corporis was more common in females than males in the age group 31-60 years which has not been reported from earlier studies.

In this study, the most common dermatophyte isolated was *T. mentagrophytes* (64%). There is no known previous similar report from this region. The previous highest reports of *T. mentagrophytes* in India were by Behl and Sharma from Delhi\(^1\) and by Sundaram et al.\(^1\) from Madras (47.3% and 49.23%, respectively) in cases of tinea corporis. From reports worldwide and other studies in India, *T. rubrum* has been reported as the most common dermatophyte causing tinea corporis, while it only accounted for 12% in our study. In our study, the second most common dermatophyte was *T. tonsurans* (20%). This high incidence is being reported from this region for the first time. The previous studies from Kashmir by Bharadwaj et al.\(^1\) and from Iran by Bassiri-Jahromi et al.\(^1\) had shown a high incidence of *T. tonsurans*, 66.2% and 50.9%, respectively, causing tinea corporis while no other reports have shown such a high incidence. *E. floccosum* accounted for 4% of cases in our study which is in concordance with most of the studies from India. Although recent studies from Europe had reported a high incidence of *M. canis* causing tinea corporis, most of the Indian studies including ours had not found such an incidence. In our study, 5.48% of the culture had grown *Candida* spp. and 1.35% *Cladosporium* spp., which was similar to the study by Garg et al.\(^1\) who had also reported growth of *Candida* and other non-dermatophyte molds in culture.

The KOH microscopy was positive in 91.9% of cases while culture was positive in only 74.3% of cases. The positivity of KOH microscopy was quite similar to that of Bindu et al.\(^1\) who reported a KOH positivity of 89% in cases of tinea corporis but higher than that of most of the studies from India and abroad who had reported a positivity ranging from 59% to 80%.\(^1\)\(^,\)\(^1\)\(^,\)\(^1\)\(^,\)\(^1\)\(^,\)\(^1\) The culture positivity (74.3%), in our study, was the highest compared to all the studies from India and abroad where it has been reported between 25.8% and 69%. The sensitivity of KOH in the study was 94.2% and specificity of 40% with a positive predictive value of 95.59% and a negative predictive value of 33.33%. This was quite similar to reports by Mohanty et al.\(^1\) who showed KOH microscopic examination was 89.41% sensitive with a positive predictive value of 93.02% and Haldane et al.\(^2\) who found KOH examination to have a sensitivity of 88%. Although the specificity in this study was lower than that of these two studies, it is in concordance with Garg et al.\(^1\) who reported a KOH specificity of 47.6%.

**CONCLUSION**

Dermatophytosis requires a multifaceted approach and antifungals play the most key role in combating these infections. The mycological profile of dermatophytosis in one particular region helps to identify the suitable antifungal agent for clearance of this infection. Although, worldwide and from most studies in India *T. rubrum* has been reported as the most common dermatophyte causing tinea corporis it only accounted for 12% of cases in this study. *T. mentagrophytes* was the most common pathogen isolated which has not been previously reported from our geographical location and only very few reports from other parts of the world. The emergence of this organism warrants a renewed look into the antifungal susceptibility...
patterns for combating this common superficial fungal infection efficiently.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Evaluation of Knowledge and Practices on Neonatal Resuscitation among Nurses in Kanyakumari District Hospitals

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Abstract
Introduction: Anticipation, adequate preparation, accurate evaluation, and prompt initiation of respiratory support are critical for successful neonatal resuscitation. At every delivery, there should be at least one person whose primary responsibility is the newly born care. This person must be capable of initiating resuscitation, including administration of positive-pressure ventilation and chest compressions.

Aim: The aim of the study is to study the knowledge and skills of labor room and neonatal intensive care unit (NICU) nurses about neonatal resuscitation.

Materials and Methods: The study was conducted on 93 nurses drawn from 4 government hospitals and 3 leading private hospitals of Kanyakumari district where maximum number of deliveries are conducted and NICU facilities are available. All the nurses were trained on neonatal resuscitation.

Results: When asked about all the steps of resuscitation 34% nurses got a score of 85% and above. Of that 22% of government nurses and 25% of the private nurses scored above 85%. There is not much difference in the score results between the nurses of government and private hospitals. Their performance in the step of chest compression was very poor.

Conclusion: The disappointing performance of the nurses in this essential skill and inconsistency in awareness of different steps of basic neonatal resuscitation underscores the urgent need for intensive training.

Key words: Knowledge, Neonatal resuscitation, Nurses, Skill

INTRODUCTION

Of the 25 million babies born every year in India, 3.5% babies experience asphyxia at birth.¹ Every 3rd newborn (NB) dying in the World is an Indian. 3 lakh Indian NBs die every year in India during their 1st h of life, most of them just because they did not get their first breath in time. Birth asphyxia is responsible for 19% of NB deaths in India.

In addition to its contribution to mortality, birth asphyxia can result mental retardation, seizure, and cerebral palsy.² About 10% of NBs require some form of assistance at birth. This makes NB resuscitation a frequently performed medical intervention. According to Neonatal Resuscitation Programme (NRP) of American Heart Association (AHA) and American Academy of Pediatrics (AAP), at least one trained person is to be present during delivery.³ This requires that the health-care personnel especially nurses involved need to be abreast with the latest recommendation and should follow them in clinical practice. The Indian Academy of Paediatrics and National Neonatology Forum of India currently follows NRP guidelines. For the successful NB resuscitation, the health-care personnel who practice the same in the labor room and NB units should have adequate knowledge on the different steps...
of resuscitation given in the updated NRP guidelines. The nurses in government hospitals and nurses in leading private hospitals were trained on NB resuscitation 5 years ago. The private nurses were trained by pediatricians of Indian Academy of Paediatrics in Kanyakumari District. The government hospital nurses were trained in Kanyakumari Government Medical College as directed by the National Rural Health Mission initiative. A survey on the knowledge of neonatal resuscitation among 192 health-care personnel of the entire Kenya showed inadequate knowledge and training. A questionnaire-based survey from Haryana, India, showed poor knowledge and practices of neonatal resuscitation among the health-care personnel attending deliveries. A survey conducted on delivery conducting nursing staff of Kalyani town in West Bengal showed, 79% nurses knew nothing about the steps of positive pressure ventilation and chest compression. A questionnaire-based survey and analysis regarding knowledge and practices of NB resuscitation among nurses in both government hospitals and private hospitals in Kanyakumari District in Tamil Nadu state was conducted.

**Aim**

The aim of the study was to study the knowledge and skills of labor room and neonatal intensive care unit (NICU) nurses about neonatal resuscitation.

**MATERIALS AND METHODS**

Study type was cross-sectional observational study. The study was conducted on 93 nurses drawn from 4 government hospitals and 3 leading private hospitals of Kanyakumari district where maximum number of deliveries are conducted and NICU facilities are available. All the nurses were trained on neonatal resuscitation. Data on their demographic information such as age, sex, year of nursing experience, qualification, work station, and previous training in neonatal resuscitation were collected and entered in a preformatted questionnaire. Data were collected by involving them to participate in a written test. The questions were selected from a standard text contained in AHA/AAP-Text book of neonatal resuscitation. The questions were divided into three steps according to the stages of neonatal resuscitation which the nurses commonly practice: (i) Preparation of equipment and initial steps of resuscitation, (ii) bag and mask ventilation, and (iii) chest compression. Endotracheal intubation and medications were excluded as they do not come under basic neonatal care. The participants took the examination under supervision and were required to complete the 20 questions test in 40 min. The questions included multiple choice single response and true/false type questions. The scoring of the test was done as per the standard directions given in text book of neonatal resuscitation. Those who scored above 85% were considered as successful. Data were analyzed using Pearson Chi-square-test.

**RESULTS**

All the 93 participants were female nurses and all were aged above 26 years, average age was 35 years. The average duration of work experience was 6 years (1-28 years range). All the participants have an experience with NB resuscitation. In our study, 40 nurses are working in labor room and 53 nurses in NICU. 31 nurses are qualified registered nursing and registered midwifery, 22 nurses are general nursing and midwifery (GNM) qualified. When asked about all the steps of resuscitation 34% nurses got a score of 85% and above. Of that 22% of government nurses and 25% of the private nurses scored above 85%. There is not much difference in the score results between the nurses of government and private hospitals. 34% of nurses scored more than 85% (Tables 1 and 2).

Of the total 93 nurses 53 nurses are working in NICU and 40 nurses in labor room. Only 18% of NICU nurses scored above 85% in all the steps of resuscitation compared to 30% of labor room nurses (Table 3).

Among the three different steps of neonatal resuscitation only 67% nurses scored above 85% in the preparation/initial steps compared to 81% nurses in the bag and mask ventilation step. Their performance in the step of chest compression was very poor, only 15% nurses scored above 85% (Table 4).
In equating the awareness of resuscitation with their nursing qualification the GNM nurses who constitute 1/3rd of the participants scored well along with the few MSc nurses. However, BSc nurses and GNRM nurses scored poorly (Table 5).

**DISCUSSION**

The results of this study reflect the neonatal resuscitation practices followed in major government and private hospitals of Kanyakumari district where most of the deliveries take place and where NICU facilities are also available. The questionnaire of this study was based on the NRP guidelines of 2010. Even though all the respondents of the evaluation survey have an average work experience of 6 years, only 34% of them scored above 85% in all the steps of basic neonatal resuscitation. All of them have an experience of neonatal resuscitation. In the Kenyan study also a similar poor performance was reported where only 35.4% scored above 85%. Even though the nurses working in the labor room scored better than those of the NICU, the difference was not statistically significant. Both were poor in the resuscitation knowledge. A survey conducted on delivery conducting nursing staff of Kalyani town in West Bengal showed, 79% nurses knew nothing about the steps of positive pressure ventilation and chest compression. But in our study, 81% nurses scored above 85% in the bag and mask ventilation step and 67% scored above 85% in the preparation step. In the chest compression step, the performance was dismal; only 15% of nurses scored above 85%. In this study, the two advanced steps of resuscitation such as endotracheal intubation and medications were omitted because they were not included in the basic neonatal resuscitation. There is a need to follow-up the procedures of knowledge and practice skills gained by the nurses into successful resuscitation practice by periodical refresher courses and evaluation. This would lead to improvement in competence of the nurses by commitment to recommended resuscitation guidelines and thereby improve the quality of care provided to NBs after birth. The participants of this study were aware of the basic resuscitation practices, but there were certain gray areas where knowledge needs to be reimposed by further training. Only a single NRP training was conducted to the nurses in 2011. As there is no statutory requirement by the regulatory authorities to check the resuscitation practice knowledge before attending deliveries, it is expected that the knowledge gap will continue. Studies conducted on neonatal resuscitation in various states of India and abroad have found out similar gaps. Even in advanced countries like Canada a clear gap in guidelines and practice was observed.

**CONCLUSION**

The disappointing performance of the nurses in this essential skill and inconsistency in awareness of different steps of basic neonatal resuscitation underscores the urgent need for intensified training. There is a need to follow-up the procedures of knowledge and practice skills gained by the nurses into successful resuscitation practice by periodical NRP refresher courses and evaluation. Teaching on the basic neonatal care including the neonatal resuscitation should be stressed during the nursing education itself to ensure acceptable neonatal outcome.

**REFERENCES**

Prevalence of Deformities in Leprosy in Tertiary Care Center

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Abstract

Introduction: Deformities are the common complications of leprosy. This study enables us to find out the common types of deformities in tertiary care center so that an effective rehabilitation can be achieved.

Aim: To find the prevalence of deformities and types of deformities in newly diagnosed patients with leprosy in our hospital.

Materials and Methods: A prospective observational study was conducted in Hansen’s department at our tertiary care hospital. About 165 newly diagnosed patients were interviewed, and clinical examination was done between August 2015 and September 2015. Data were collected and analyzed.

Results: Out of 165 patients 50 patients had observable deformities (30%). Out of 50 patients, 30 (70%) were males, and 20 (30%) were females. Hand deformities were most common and next common were feet deformities. Multibacillary patients were more affected than paucibacillary patients.

Conclusion: Early diagnosis and treatment will prevent deformities. All health-care professionals have to be trained to identify leprosy. Rehabilitation facilities have to be strengthened to take care of these patients.

Key words: Deformity leprosy, Multi bacillary disease, Multi drug therapy

INTRODUCTION

Leprosy is a chronic granulomatous disease caused by Mycobacterium leprae. This disease mainly affects the skin, nervous system, bones, mucosa, upper respiratory tract, and eyes.¹ This disease is classified into five types according to immunological status. They are tuberculoid, borderline tuberculoid, borderline, borderline lepromatous, and Lepromatous leprosy.² Cardinal features of Leprosy are hypopigmented skin lesions, loss of sensation and positive smear. The presence and number of bacilli determine the type of disease.³ Different spectrum of the disease accounts for the different types of deformities.⁴ Multibacillary patients had more deformities compared to paucibacillary patients.⁵,⁶ Deformity is the visible alteration in the form, shape or appearance of the body due to impairment produced by the disease. In leprosy, deformity may be so insidious and painless and obvious only in late stages. Some patients experience severe reactions and develop deformities.⁷

Aim

To find the prevalence of deformities and types of deformities in newly diagnosed patients with leprosy in our hospital.

MATERIALS AND METHODS

This study was a prospective observational study which included 165 patients attending Hansen’s Department at Madras Medical College. Among them, 50 patients who were newly diagnosed as leprosy and were not on antileprosy drugs were examined clinically, and detailed history was recorded. Sociodemographic factors were also computed and deformity graded. WHO disability grading was used to assess the patients.
RESULTS

Out of 165 new leprosy patients, 50 patients were found to have deformities and disability and deformity index is 30.3%. Out of these 50 patients, 35 (70%) were males, and 15 (30%) were females. Thus, deformities were more common in males than females with a male:Female ratio as 7:3. Medical care was not available in 33 cases with deformities at their own places. The most commonly affected age group was 41-50 years with 15 (30%) of patients followed by 20-30 years age group with 11 (22%) patients. Deformities were more in the lower socioeconomic group (42%) followed by upper socioeconomic group (28%). Manual laborers (24%) were the most common occupation with deformities followed by farmers (14%).

Deformities were highest in disease with duration 2-5 years followed by >5 years (Figure 1). The deformities were common in lepromatous leprosy patients with a total of 15 (30%) followed by borderline lepromatous with a total of 13 (26%) (Figure 2).

Deformities were common in multibacillary patients with a total of 42 (86%) than paucibacillary patients 8 (24%) patients. Deformities were more commonly found in the hands with total of 39 patients followed by feet then both hands and feet. It was followed by face and eyes. In the case of hand deformities, sensory loss was found to be common with a total of 20 patients followed by numbness and weakness of hands in 11 and 9 patients, respectively. In the case of foot deformities, numbness (paraesthesia) was found to be common with a total of 11 patients followed by glove and stocking type of anesthesia in 9 patients. Anesthetic type of deformities was found to be common with a total of 44 (88%) cases followed by specific deformities with 18 (36%) cases. (Figure 3) Least deformity was paralytic deformity with a total of 16 (32%) cases. Grade 1 (WHO) deformities were more common with a total of 23 (46%) cases followed by grade 2 in 20 cases (40%).

DISCUSSION

Deformities in leprosy are the most striking manifestation. It may range from mild degree such as sensory loss over the hands to a very severe degree such as complete claw hand and resorption of fingers. Grade 1 deformities are most common followed by Grade 2 deformities. In our study, sensory loss (40%) was the most common anesthetic deformity, and weakness (18%) was the most common paralytic deformity in the case of hands. Numbness (22%) was the most common anesthetic deformity, and foot drop (8%) was the most common paralytic deformity in the case of foot. Those patients with Grade 2 deformities must have passed through the stage of Grade 1 deformity. Therefore, it is essential to do a thorough peripheral nerve examination in a case of leprosy. Assessment of sensory and motor nerve functions along with nerve palpation for thickening, tenderness, and reactions is mandatory. Furthermore, patients should be properly referred to specialists whenever required. Multibacillary leprosy cases were having higher deformities than paucibacillary patients. It is similar to the results of a study conducted by Chhabra et al. Hence, early diagnosis, proper multibacillary-multidrug therapy, health education to patients and community, rehabilitation help in preventing the patients from the biomedical and psychosocial consequences of leprosy. This enables them to repossess their roles and functions in the society.
CONCLUSION

The deformities were the most distressing features for our patients. Health education plays an important role in prevention and the progression of deformities. Early diagnosis and proper treatment prevent patients from the brunt of disabilities due to leprosy. Hence, searching for Grade 1 deformity should be done by all our health care workers.

REFERENCES

2. Ridley DS, Jopling WH. Classification of leprosy according to immunity.
8. Sarkar J, Dagupta A, Dutt D. Disability among new leprosy patients, an issue of concern: An institution based study in an endemic district for leprosy in the state of West Bengal, India. Indian J Dermatol Venereol Leprol 2012;78:328-34.


Source of Support: Nil, Conflict of Interest: None declared.
Revalidation of Trigger Point Injection in Myofascial Pain Syndrome, Assessed by Pain Disability Score

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Abstract

Background: Myofascial pain syndrome (MFPS) is defined as the “sensory, motor, and autonomic symptoms caused by myofascial trigger points (MTrPs)” and is a recognized medical diagnosis among pain specialists. MFPS continues to be one of the most commonly missed diagnoses. It has been estimated that some 44 million Americans have myofascial pain problems. Local anesthetic is the most common drug effectively used for injection into trigger points. The tool for assessment is usually the pain score (either visual analog scale or numerical rating scale). However, the patients with MFPS suffer from pain, depression, and other psychosocial factors, which contribute to their disability.

Materials and Methods: In this prospective, sequential study, 30 patients were selected for the study. The pain disability questionnaire was filled up on the first visit and was used as control. Patients were then given trigger point injections on 1st, 7th, and 30th day, and the questionnaire was again filled up at 1 month from the day of 3rd injection. All the data were analyzed by using student’s paired t-test, and P < 0.05 was considered significant.

Result: Significant reduction in pain disability score was noted. On comparing both the groups, it was found statistically significant (P < 0.01).

Conclusion: Trigger point injections with lignocaine 1% were shown to be an effective therapy for trigger point in MFPS, when assessed by the pain disability score. The improvement was not only in terms of intensity but also from the psychosocial aspect as well.

Key words: Myofascial pain syndrome, Myofascial trigger points, Pain disability score, Trigger point injections

INTRODUCTION

Myofascial pain syndrome (MFPS) is a widely recognized phenomenon in clinical practice, in which widespread or regional muscular pain is associated with hyperalgesia, psychological disturbances, and significant restriction of daily functioning.¹ It has been estimated that some 44 million Americans have myofascial pain problems.² Trigger points are the hallmark of MFPS. Active myofascial trigger points often play a role in the symptoms of patients with tension headaches,³ low back pain,⁴,⁵ neck pain,⁴ temporomandibular pain, forearm and hand pain, postural pain,⁷ and pelvic/urogenital pain syndromes.⁸ There remains much to be elucidated with regards to their pathophysiology,⁹ mechanisms of pain referral,¹⁰ and treatment of choice.¹¹ The diagnosis of trigger points relies on finding a local tender spot within a taut muscle band.¹² However, there is a lack of a gold standard for assessment of trigger points.¹²,¹³ The common treatments for trigger points are physical modalities, manual therapy, non-steroidal anti-inflammatory drugs, topical analgesics, spray and stretch with vapocoolants, topical analgesic, local injections with a myriad of drugs including lidocaine, botox, steroids, normal saline, and dry needling.¹¹

Major depression is present in 23% to 78% of the patients with chronic pain as against 5% to 17% in general
population. Patients with MFPS has been shown to have a negative correlation of quality of life (QOL) with pain intensity. Disability pain questionnaire (DPQ) is a psychosocial yardstick for assessment of clinical outcomes in patients with chronic musculoskeletal disorders and focuses on function, disability, and activities of daily living (ADLs). The score ranges from 0 (perfect function) to 150 (total disability).

The aim of this study is to objectively revalidate treatment of trigger point injection with lignocaine 1% using pain disability score. Control group was not possible as even normal saline injection and dry needling have a therapeutic effect.

MATERIALS AND METHODS

The study was conducted at ESI Institute of Pain Medicine, ESI Hospital, Kolkata, between May 2014 and August 2014. Incidentally, most of our patients are industrial laborers.

After obtaining approval from the Institutional Ethics Committee, the patients were recruited according to the following inclusion and exclusion criteria:

Inclusion Criteria
- Patients in the age group of 30-60 years with MFPS.
- Patients on conservative therapy with drugs, e.g., gabapentin, amitryptiline, and paracetamol (as and when necessary basis), for a minimum period of 6 weeks.

Exclusion Criteria
- Patients with any systemic disease.
- Patients with bleeding diathesis or on anticoagulants.
- Patients on any other medications other than the ones specified in our study.
- Patients who do not fulfill the minimum diagnostic criteria of active trigger points.
- Patients not consenting to be part of the study.

All patients were explained the procedure in detail and were asked to fill the DPQ form before the procedure. Patients were then put in a comfortable position, (depending on the target area) and the skin overlying the area to be injected was prepared with an antiseptic solution. The trigger point was then palpated within the taut muscle band and stabilized between two fingers of the non-dominant hand. A 26-gauge needle of ½ or 1½-inch needle (depending on the depth to reach the trigger point) was quickly inserted through the skin and passed into the zone of trigger point. If a local twitch response was obtained, it confirmed the correct placement of the needle. After aspiration, 0.5 ml of injection. Lignocaine was injected. Lignocaine (1%) was injected into each trigger point. A sterile dressing was placed over the area, and the patient was monitored for about half an hour. The patient was then discharged with post-operative advice. Similar trigger point injections were given for three consecutive weeks and response noted. The patient was asked to report for follow-up after 1-month from the date of 3rd injection and the DPQ was filled up to compare the difference in scores.

Results were compared by paired t-test using SPSS 17 software. P < 0.05 was considered significant. Goodness of fit was assessed with Pearson’s correlation coefficient and R² evaluation.

RESULTS

30 consenting patients (both male and female) were recruited for the study. The DPQ was filled up pre- and post-injection and the two scores were compared. Of the 30 patients included in the study, 26 patients showed improvement, 2 patients did not have much change in their disability score, and 2 patients had worsening of their disability.

The mean age of the sample was 44.8 ± 10.4 years with a range of 21-67 years.

There was a significant difference between the pre and post procedure scores with P = 0.001.

The coefficient of correlation was 0.671 with a P = 0.001 (one tailed).

R² value for the goodness of fit was 71.6%.

DISCUSSION

A total of 30 patients were selected for the study. The average age of the sample was 44.8 ± 10.4 years. The age range is between 21 and 67 years. Our sample conforms to the studies by Sahin et al., where the median age was 40.4 years and the age range was 18-55 years.

However, our studies showed that more males were affected, which is in contradiction to other studies. This can be due to the fact that, our institute serves patients who are mostly manual laborers from low socioeconomic strata. The subjects are therefore more prone to develop repeated musculoskeletal injury. Since they are also the bread earner of the family, they are also under constant mental stress. Studies have also shown that men with fibromyalgia syndrome (seeking treatment) have shown more severe symptoms and poorer QOL. The
socioeconomic structure also does not consider female’s health a priority and less female member access the health system. The sample group was treated for trigger points in different parts of the body including neck and shoulders, lower back and sacroiliac joint and gluteal region. However, a specific patient was treated for one region only.

There was a significant improvement in pre- and post-procedure DPQ scores, \((P < 0.05)\). This shows that there was not only a decrease in the intensity of pain with the above treatment\(^ {20}\) but there was also a significant improvement in the QOL.

Patients who have failed more conservative measures such as physiotherapy, manipulation, and pharmacotherapy are candidates for more invasive procedures like injection of lidocaine 0.5-1% into diagnosed trigger points.\(^ {20,21} \) Although visual analog scale (VAS) is a common yardstick to assess improvement, psychosocial scores (similar to) DPQ are Infrequently used, but have shown to reflect outcomes.\(^ {21} \) However, we have used DPQ as a primary measure to assess the outcome of trigger point injections, as MFPS have complex attributes apart from physical pain, which can be better addressed by such questionnaires. We have not found studies where DPQ has been used as a primary tool for revalidation of trigger point injection.

Revalidation of trigger point injection with DPQ shows that the above treatment is successful in decreasing pain and disability and improving the QOL in patients with MFPS.

The most common side effects of the procedure were pain and soreness at the site of the injection. The other side effects were bruises, muscle spasm and restriction of movement of the nearest joints for 1-2 days. Patients were advised paracetamol for pain and cold and hot fomentation for soreness.

The study has some drawbacks. The number of the sample is small. Larger studies with more number of patients and over extended period can yield better results. VAS score as a tool should be included so that the study can be better compared to other similar studies.

**CONCLUSION**

MFPS is a chronic painful condition of musculoskeletal system with high disability index. It is also associated with psychological attributes which need to be taken into consideration. Its pathophysiology is still to be fully elucidated. Trigger point is the pathognomonic lesion for MFPS. Different modes of treatment are advocated for the above condition. One of the common modes of treatment is trigger point injection with lignocaine. VAS is the usual assessment tool for assessing the improvement after treatment. However psychosocial attributes cannot be assessed by VAS. DPQ is a tool that assesses psychosocial and ADL in chronic pain conditions. This study shows that DPQ can evaluate and reflect improvement in psychosocial and ADL attributes after trigger point injection, with 1% lignocaine, revalidating the above treatment.

**ACKNOWLEDGMENT**

The authors would like to thank Mr. Gopesh Talukdar (Statistician).

**REFERENCES**


How to cite this article: Jaiswal M, Sanyal RP, Goswami S. Revalidation of Trigger Point Injection in Myofascial Pain Syndrome, Assessed by Pain Disability Score. Int J Sci Stud 2017;5(1):172-175.

Source of Support: Nil, Conflict of Interest: None declared.
Efficacy of Lignocaine with Clonidine and Adrenaline in Lower Third Molar Extraction

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Abstract

Introduction: The use of local anesthesia in oral surgical procedure is to ensure the comfort and safety of the patients. Local anesthetics agent may be used with or without vasoconstrictor.

Materials and Methods: The study was conducted to compare and evaluate the efficacy of clonidine as a substitute for vasoconstrictor. It was carried out on 10 patients undergoing bilaterally third molar surgeries.

Results: The hemodynamic changes were stable in clonidine group as compare to epinephrine group and post-operative analgesic effect were better in epinephrine group.

Conclusion: Clonidine as an additive to the local anesthetic solution gives stable cardiovascular hemodynamic parameters and also reduces anxiety. However, there was no much difference in respect to systolic blood pressure, diastolic blood pressure, heart rate, and onset of action.

Key words: Clonidine, Epinephrine, Hemodynamic, Vasoconstrictor

INTRODUCTION

Local anesthesia is the main component in dental practice. Local anesthetic produces temporary loss of sensation. Local anesthetic alone has a greater tissue perfusion and shorter duration of action. To overcome the drawback, vasoconstrictor is added. Adding vasoconstrictor to the local anesthesia reduces the rate of absorption from the site of injection or infiltration. The action of vasoconstrictor prolongs the duration of action of the anesthetic agent and reduces bleeding at the site of surgery.

Clonidine is the centrally acting α-2 adrenoreceptor agonist. Clonidine has certain hemodynamic effects during stressful condition. This study was undertaken to evaluate the effect of the plain local anesthetic agent after adding clonidine to it and compare it with the local anesthesia with epinephrine.

MATERIALS AND METHODS

The study was done in 10 patients who were undergoing bilateral third molar surgery and randomly selected both sexes (male and female) between the age of 18 and 40 years, American Society of Anesthesiologists I (ASA I) and surgical site free of infection. Nursing mother, pregnant and medically compromised patient were excluded from this study. Informed consent was taken from every patient before the procedure. Patient allergies to local anesthetic solution were excluded from the study. Patients received 2 ml of 2% lignocaine with epinephrine (12.5 mcg/ml) in one side and 2 ml of 2% lignocaine with clonidine (1 on the other side.

The solution of lignocaine with clonidine was freshly prepared. 9 ml of 2% lox (2% lignocaine hydrochloride) was taken in a 10 ml syringe and mixed with 1 ml of clonidine hydrochloride. Then the mixture was transferred to 2 ml syringe before the injection.

The procedure was undertaken into two different appointments. The sides were divided into two groups. The side which receives 2% lignocaine with epinephrine was named as Group A and the other side which receives
2% lignocaine with clonidine as Group B. Patients were evaluated (starting at the time of injection till the end of the procedure) for systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR). The parameters were recorded every 10 min starting from the procedure till the end of the procedure. The post-operative analgesia was evaluated by using visual analog scale (VAS).

**RESULT**

The results obtained in ASA I patients demonstrate that the anesthetic solution with clonidine, as a vasoconstrictor, does not have much significant difference in SBP (Figure 1), DBP (Figure 2), and HR (Figure 3) statistically. Although the parameters of local anesthesia were similar in both the groups, the cardiovascular parameters during anesthesia with clonidine-containing local anesthetic solution were more stable than adrenaline group. The onset of action and duration of action show not much difference between the two groups (Figures 4 and 5). Comparison of VAS between the two groups states that the post-operative analgesic effect is slightly more in clonidine group (Figure 6). These findings may be relevant to oral and maxillofacial surgeons endeavoring to find a vasoconstrictror for local anesthetic solution with minimal cardiovascular risk and longer post-analgesic effect. Multiple variable factors exist such as technique variability, anatomical variations, complexity of procedure, and reporting error. Pain itself is multifactorial; and perception and pain reaction vary greatly among individuals. Clonidine has shown to reduce anxiety perioperatively and give a longer post-analgesic effect.

**DISCUSSION**

Local anesthesia is the main key of successful treatment of for any minor surgical dental procedure. The effectiveness depends on the local anesthetic agents and additive used. Normally, adrenaline is used as a vasoconstrictor to lengthen the duration of anesthetic effect and to reduce the bleeding during the procedure. It appears that clonidine could be a useful alternative to adrenaline for intraoral anesthesia and may have a role in those with cardiovascular disease or those particularly sensitive to adrenaline. Several studies have been carried out using different concentrations of clonidine for the enhancement of epidural anesthesia, brachial plexus anesthesia, and anesthesia of peripheral nerves. These studies have shown that the effective concentrations of clonidine, without significant side effects, were 150 μg/ml, 90 μg/ml, 30 μg/ml, 10 μg/ml, and 5 μg/ml. Clonidine at 5 μg/ml can be safely used as additives with lignocaine, in intra-oral anesthesia.
Rajkumar, et al.: Effect of Clonidine with Lignocaine

In a study by Brkovic et al., there was no significant difference in the onset of anesthesia between the clonidine and the epinephrine groups, because the onset of anesthesia primarily depends on the characteristics of local anesthetics.1

In this study, 2% lignocaine hydrochloride with 1:80,000 adrenalin was used for the anesthesia of one side and 2% lignocaine hydrochloride with clonidine (15 µg/ml) on the other sides. Clonidine is α-2 adrenoreceptor agonist with both central and peripheral action. It decreases the blood pressure, produces a central analgesic effect and is a mild sedative due to its central activation of presynaptic α-2 adrenoreceptor. It brings about vasoconstriction of peripheral blood vessels due to activation of postsynaptic α-2 adrenoreceptors. When used as a central hypotensive agent, in different routes of administration, it enhances local anesthesia and analgesia.8 Hemodynamic parameters of all the patients were monitored. HR, SBP, and DBP were noted. In a study done by Hassan et al., the cardiovascular parameters during anesthesia with clonidine-containing local anesthetic solution were more stable than adrenaline group, whereas parameters of local anesthesia were similar in both the groups.9 In our study, there was no statistically no significant difference between mean values of SBP and DBP in the clonidine and adrenaline groups, but the stability of the cardiovascular parameters was more in clonidine group than the adrenaline group.

Mazoit et al. reported that in cardiovascular patients, clonidine in lidocaine anesthesia given for cervical plexus block produces hemodynamic stability, which was not observed in lidocaine with epinephrine-treated patients in whom significantly increased HR was recorded.10

In a study by Brkovic et al.,2 it was proved that HR before anesthesia administration for lidocaine with clonidine group was 85.4 ± 3.1 bpm and decreased significantly 10 min after surgery (80.9 ± 2.8 bpm). Clonidine increased the risk of bradycardia, arterial hypotension, and sedation. This was not unexpected and it is most likely the result of systemic reabsorption.11 This study showed the difference in mean HR preoperatively and intraoperatively was not so significant between clonidine and adrenaline group.

Clonidine is known to produce sedation, analgesia, and hemodynamic stability. It is also known that clonidine prolongs spinal anesthesia when added to intrathecal local anesthetic agents or when taken orally.12 There are no differences in the enhancement of duration and intensity of intra-oral anesthesia with adrenaline and clonidine, whereas clonidine might have hemodynamic advantages over adrenaline as a vasoconstrictor because of its central hypotensive effect.7 James Eisenach showed that there was no significant statistical difference between clonidine and adrenaline group when intensity of anesthesia was evaluated VAS and verbal rating scale.

In a study done by Hassan et al.,9 the total number of pain medication doses taken was significantly lower in clonidine-treated patients, compared with those treated with adrenaline in 24 h postoperatively. The mean duration of analgesia was more with clonidine group compared with adrenaline group indicating that clonidine increases the duration of post-operative analgesia. In our study, post-analgesic effect was slightly more in clonidine 2 h after the procedure. All the patients show mild pain 2 h after the procedure in clonidine with adrenaline group, whereas 80% of the patient shows mild pain and 20% of the patients show moderate pain in lignocaine with adrenaline group. The mean duration of analgesia was slightly more with clonidine group compared with adrenaline group indicating that clonidine increases the duration of post-operative analgesia. Overall, hemodynamic changes were stable in lignocaine with clonidine group as compared to lignocaine with adrenaline group.

Clonidine has also been shown to have a peripheral analgesic effect by releasing enkephalin-like substances.7 The mechanism by which clonidine produces this neurological blockade is not clear, but it may be a result of: (1) A membrane stabilizing effect on the axons similar to that of local anesthetics solution, (2) the α-2/α-agonist effect on the neurones, (3) or a combination of both of these effects. Clonidine alone or in combination with local

Figure 5: Duration of action till the return of normal sensation

Figure 6: Post-operative analgesia
anesthesia is more likely to produce effective analgesia in patients with neurological deficit associated with their pain, i.e., neuropathic pain. The combination of lignocaine + clonidine provides the best short- and long-term analgesia, suggesting that clonidine is supra-additive.13

Brummett et al. have stated that clonidine when used with short and intermediate-acting local anesthetics prolongs the duration of anaesthesia.14 Clonidine is said to also cause sedation when used in high doses (100 µg), but the concentration (10 µg) used in our study did not produce any untoward side effects.6

In this study, one patient shows longer onset of action in lignocaine with adrenaline group. There are several factors which affect the action of local anesthesia. Site of injection, pKa of the anesthetic solution and the injection technique relative to nerve morphology are some of the factors which might give false reading during the onset of the local anesthesia.

All the patients were monitored for 2 h following the procedure and discharged without any complaints, side effects and local or systemic adverse reactions to the drug under study. All the patients at the end of 2 h were discharged with a prescription containing analgesic, anti-inflammatory, and antibiotic. Shelf-life of freshly prepared lignocaine with clonidine was 8 h, whereas lignocaine with adrenaline has a proven longer shelf-life. This indicates that freshly prepared solution of lignocaine with clonidine should be used for every procedure, which may add to the cost of treatment. Patients falling in ASA I category was only included in this study. The cardiovascular soothing effect of clonidine suggests that this drug can be a safe choice to be used in patients in whom adrenaline use was to be avoided.

CONCLUSION

From our study, we conclude that clonidine as an additive to the local anesthetic solution gives stable cardiovascular hemodynamic parameters and also reduces anxiety. However, there was no much difference in respect to SBP, DBP, HR and onset of action. Post-analgesic effect in clonidine was found out to be better than adrenaline group. However, a more elaborate study with a larger sample size may be essential to be more conclusive.

ACKNOWLEDGMENT

Authors want to thank Dr. B H Sripathi Rao, Principal and H.O.D, Oral and Maxillofacial Surgery, Yenepoya Dental College, for his support throughout the study and Dr. Joyce Sequeira, professor, Department of Oral and Maxillofacial Surgery, Yenepoya Dental College, for her support and guidance during the study.

REFERENCES

Retrospective Cohort Study Analyzing Clinical Utility of Cefpodoxime-ofloxacin Combination in Patients with Community-acquired Infection at Different Outpatient Setting across India

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Abstract

Background: In India, the infectious disease burden is among the highest in the world, and recent World Health Organization report showed the inappropriate and irrational use of antimicrobial agents against many diseases, which led to increase in the development of antimicrobial resistance. Third generation cephalosporins offer increased stability to β-lactamases and an extended spectrum of antibacterial activities, including Gram-positive and Gram-negative pathogen with low minimum inhibitory concentration against sensitive and resistance strain. Fluoroquinolones, a broad spectrum antibiotic, are widely regarded as the most effective drug for the treatment of community-acquired infection. Similarly, the need of broad spectrum antibiotics alone or in combination has been well highlighted in real-world setting due to overlapping symptom and limitation of available diagnostic technique.

Objective: The objective of this study is to evaluate the prescription of patients who were prescribed cefpodoxime-ofloxacin combination.

Materials and Methods: Retrospective cohort study conducted among 155 outpatient centers across India that analyzed prescriptions where the fixed-dose combination (FDC) of cefpodoxime and ofloxacin in the month of June-August 2015 was prescribed.

Results: Totally, 6274 study participants were included in the study, of which 58% were male, and 35% were female, the average age was 36.6 years (range 10-80 years). Typhoid (90%) was the most common indication for which the FDC was prescribed followed by urinary tract infection (UTI) (9%) and acute gastroenteritis (1%). Follow-up data of 85.6% participants were recorded, of which 46.6% has defervescence within 5 days. Cefpodoxime (200 mg)-clavulanic acid (200 mg) was prescribed for 7-14 days in typhoid fever, for 3 days in UTI and for 7 days in acute gastroenteritis. Diarrhea (0.1%) was the most common adverse effect noted which was mild in intensity and was managed symptomatically. There were no serious adverse events recorded.

Conclusion: Cefpodoxime-clavulanic acid combination is clinically feasible option for uncomplicated enteric fever, UTI, and AGE.

Key words: Cefpodoxime, Community, Ofloxacin, Typhoid, Urinary tract infection

INTRODUCTION

Tropical infections, which are prevalent in tropical and subtropical regions, are always considered whenever a pyrexial episode occurs. Fever, which occurs as a response to infection, is generally considered as a host defense response which helps in decreasing mortality and morbidity.¹ It is the most common and worrisome symptom that the health-care provider assess.² It may herald the onset of a serious and life-threatening disease such as meningitis or it may be the sole manifestation of a mild self-limited viral infection. Several clinical studies have shown that the magnitude of fever is associated with severity of infection, as a result patient with the highest fever tends to have high-mortality rate.¹ Among patients
with febrile illness requiring admission, case fatality ratios are high, sometimes exceeding 20%. Antimicrobial therapy is the mainstay for the treatment of fever such as enteric fever or any other fever of bacterial origin, but there is emergence of multidrug resistant (MDR) typhoid fever in the late 1980s, in many parts of the world, including the Indian subcontinent. Efficacy, availability, and cost are important criteria for the selection of first-line antibiotics to be used in developing countries. In a vast country like India, knowledge of areas, seasonality with recent outbreaks can be very helpful in recognizing the clinical entity.

Cephalosporins are commonly used to treat broad spectrum of bacterial infections. Over the past 40 years, many cephalosporins have been developed; of these, several orally absorbable molecules have been used mainly in community-acquired infections. Third-generation cephalosporins offer increased stability to β-lactamases and an extended spectrum of antibacterial activities, including Gram-positive and Gram-negative pathogens with low minimum inhibitory concentration against sensitive and resistant strain of Salmonella typhi, Streptococcus pneumonia, Haemophilus influenza, and Moraxella catarrhalis. One of these is cefpodoxime proxetil, an esterified compound that exhibits an improved intestinal absorption and increased bioavailability compared with previously developed oral cephalosporins. The cost and emergence of resistance to the other oral cephalosporin, cefixime, has made cefpodoxime to be used widely. The pharmacokinetic characteristics of cefpodoxime enable enterohepatic recycling while ensuring adequate cover against Gram-negative strain of Salmonella typhi.

Fluoroquinolones, a broad spectrum antibiotic, are widely regarded as the most effective drug for the treatment of typhoid fever. They are relatively inexpensive, well tolerated and more rapidly and reliably effective than the former first-line drugs, namely, chloramphenicol, ampicillin, amoxicillin, and trimethoprim-sulfamethoxazole. They produce a rapid therapeutic response, i.e. clearance of fever and symptoms in three to 5 days, and very low rates of post-treatment carriage. Ciprofloxacin, ofloxacin, perflaxin, and fleroxacin are common fluoroquinolones proved to be effective and used in adults. Fluoroquinolones also have the advantage of lower rates of stool carriage than the first-line drugs.

The combination of cefpodoxime and ofloxacin when used as a fixed-drug combination (FDC) acts on different target sites providing a synergistic effect against most of the pathogens. Cefpodoxime kills bacteria by inhibiting bacterial cell wall synthesis, and ofloxacin kills by affecting bacterial DNA gyrase. And also, both cefpodoxime and ofloxacin have been recommended by the World Health Organization for the treatment of community-acquired infection.

In this regards, a retrospective study was conducted to evaluate the prescription of cefpodoxime-ofloxacin combination in the treatment of fever.

**MATERIALS AND METHODS**

This was a retrospective cohort study conducted among 155 outpatient centers across India that analyzed prescription prescribed the FDC of cefpodoxime and ofloxacin in the month of June-August 2015. Confidentiality of the patient data was ensured by the doctors who record the relevant details and identifiers on the case sheet distributed to the center in September 2015. The data collected was compiled, analyzed and was expressed in terms of arithmetic mean and percentage.

**RESULTS**

Base line data were collected from 155 different outpatient center across India, in which prescriptions of patients who were prescribed cefpodoxime-ofloxacin combination as FDC were analyzed. Totally, 739 prescriptions were reported and were subjected for analysis, among which, the clinical data for 1465 patients in terms of patient’s identifier and diagnosis were incomplete and therefore omitted from the final analysis. The remaining 6274 prescriptions with definitive diagnosis such as enteric fever, urinary tract infection (UTI), and gastroenteritis were analyzed in the study. Among the study participants, 62% (3889) were male, and 38% (2385) were female, the average age was 36.6 years (range 10-80 years). Enteric fever (90%) was the most common indication for which the FDC was prescribed followed by UTI (9%) and acute gastroenteritis (1%) (Figure 1). Cefpodoxime 200 mg and ofloxacin 200 mg were prescribed for 7-14 days for enteric fever, 3 day in UTI, and 7 days in patients diagnosed with acute gastroenteritis (Table 1). Among 5667 patients of enteric fever, 5144 (90.77%) were diagnosed with typhoid. Follow-up data of 4402 (85.6%) patients diagnosed with typhoid.
typhoid fever was available and analyzed. Totally, 43 (0.8%) patients were given concomitant parenteral therapy. Among the typhoid patients, 2053 (47%) had defervescence within 5 days, of which, 233 (11%) had therapy duration for ≤5 days. Remaining 53% had defervescence within 14 days of therapy. History of prior antibiotic therapy for current condition was available in 708 patients diagnosed with typhoid, among whom, 357 patients had no prior antibiotic intake whereas 351 patients revealed prior antibiotic therapy. Amoxicillin, cephalosporin, and ciprofloxacin were the common antibiotics taken. Diarrhea (0.1%) was the most common adverse effect noted (Table 2). Other adverse effects noted were nausea, vomiting, decreased appetite, abdominal pain, and giddiness. There were no serious adverse events (SAEs) recorded.

DISCUSSION

Enteric fever is considered as an important cause of illness with estimated global burden of >27 million cases per annum with a clinical relapse rate of 5-20%. Antimicrobial resistance is a major public health problem in both S. typhi and Salmonella paratyphi and timely treatment with appropriate antimicrobial agents is important for reducing the mortality of enteric fever. Antimicrobial resistance has rendered many drugs, particularly older fluoroquinolones useless as therapy for typhoid. Despite many efforts, including the implementation of faster and more accurate diagnostic tools, such as biomarkers, polymerase chain reactions, and radiological tests, the tests lack sufficient speed and reliability to justify clinical decision-making based on test results alone. Hence, both identification of bacterial infection and risk stratification remains very difficult and time-consuming in these patients in the emergency setting. As a result, empirical therapy is mostly initiated by the practicing physician which is leading to the worldwide problem of antibiotic resistance.

As the two pharmacologically distinct categories of drugs, i.e. cephalosporins and fluoroquinolones act through a different mechanism, they provide rapid bacteriological eradication, thus it is empirical to combine them for management of enteric fever. Improved efficacy of the combination compared with a fluoroquinolones alone is considered because of its synergistic effect; cefpodoxime inhibits bacterial cell wall synthesis and ofloxacin affects bacterial DNA gyrase. As both acts on different target sites, combination provides synergistic effect against most of the pathogens. Current, the incidence of MDR S. typhi (MDRST) varies from 25% to 55% in India. Resistance has developed against most of the important therapies which were previously used as a 1st line of therapy. Studies indicate that emergence of resistance is less common when combination therapy is used.

In the present study, we analyzed the prescriptions of 6274 patients, who were prescribed cefpodoxime-ofloxacin combination as FDC, among them 62% were male and 38% were females, which can be due to treatment-seeking behavior, occupational activities- and sociocultural barriers promote male to reach the higher health centers, similar results were also seen in studies conducted by Jain et al. and Pathak et al. Typhoid was the most common indications for which the combination was prescribed followed by UTI and acute gastroenteritis. Cefpodoxime being a third-generation cephalosporin is active against most of Gram-positive and Gram-negative bacteria and has also shown to have excellent activity against Salmonella species. It is considered as an effective and cheap oral option for treatment of uncomplicated typhoid fever.

S. typhi and S. paratyphoid A, B, and C are usually, extremely sensitive to the newer fluoroquinolones antibiotics. In time-kill studies, the fluoroquinolones are significantly more rapidly bactericidal than other antibiotics used for treatment. The fluoroquinolones should now be regarded as the treatment of first choice for typhoid fever. They sterilize the blood more rapidly than other drugs, and in general, fever clearance times have ranged between 3 and 5 days. They give the most rapid response rates, the highest cure rates, and the lowest rates of residual stool excretion without significant adverse effects in treatment courses as short as 2 days.

The combination achieves high biliary concentration which enhances the killing of organisms persisting in the biliary passage and thus reduces the rates of relapse and chronic carriage of typhoid pathogen. Favorable pharmacokinetic profile of the combination allows twice daily administration of the drug.

Diarrhea (0.1%) was the most common adverse effect reported in the study. It was mild to moderate in severity and so was managed symptomatically with antidiarrheal medication. No SAE was reported in our study.

| Table 1: Posology details for the cefpodoxime proxetil/ofloxacin combination |
|-----------------------------|-----------------|-----------------|-------------------------|
| Indication                  | Number of patients (%) | Duration of therapy (days) | Dose                      |
| Enteric fever               | 5667 (90)         | 7-14             | Cefpodoxime 200 mg+ofloxacin 200 mg |
| UTI                         | 563 (9)           | 3                |                          |
| Acute gastroenteritis       | 67 (1)            | 7                |                          |

UTI: Urinary tract infection
Dr. ChBangaro Rao, Dr. K Senthil Kumar, Dr. B Shirley Prasad, Dr. Anish Bhati, Dr. Kiran Aithal, Dr. P C Raval, Dr. PradeepMakwana, Dr. Pratapjejhavani, Dr. Rajendra Patil, Dr. B C Jain.

REFERENCES


In tropical country like India with contrasting availabilities of diagnostic tests or labs, a clinical case of fever especially during monsoon presenting with overlapping symptoms is often managed by cephalosporin combinations including cefpodoxime proxetil/ofloxacin as empirical therapy especially in real world outpatients settings.

With the recent increase in the prevalence of resistance to β-lactam and fluoroquinolones monotherapy for S. typhi, combination therapy has shown quick defervescence and less side effect, so, should be considered as front line in the treatment of enteric fever.

CONCLUSION

Infection caused by S. typhi remains an important public health problem, particularly in developing countries like India. Considering the cost, availability, and efficacy of the treatment, FDC of cefpodoxime and ofloxacin offers “therapeutic compliance” for empirical management of Gram-positive and Gram-negative pathogen with excellent tolerability and safety.

ACKNOWLEDGMENT

Dr. S P Chavan, Dr. Jatin Hurbada, Dr. Amit M Trivedi, Dr. Rana Rajesh Singh, Dr. Vishal Bhatnagar, Dr. Mohanjeet Kaur, Dr. Sarabjit Singh, Dr. Renjit Thomas, Dr. Girish Kumar, Dr. Dinesh Patel, Dr. B Sivakumar, Dr. S Routh, Dr. Arun Kumar, Dr. Prasad Babu, Dr. Manish Tuteja, Dr. M Satyanarayan, Dr. E Anatha Sarma, Dr. M Shyam Prasad, Dr. Anish Bhati, Dr. Kiran Aithal, Dr. B S Walia, Dr. ChBangaro Rao, Dr. K Senthil Kumar, Dr. B Shirley Jewette, Dr. I Veluchamy, Dr. Nita Madhav Prusty, Dr. Kaplesh V Surana, Dr. Rahul Mahajan, Dr. Venketesh H Dubbe, Dr. Smruti Rekha Sahoo, Dr. P K Behera, Dr. Satish Mamindwar, Dr. D Srinivas, Dr. Zahid A Mansuri, Dr. Vishal R Shah, Dr. P C Raval, Dr. PradeepMakwana, Dr. Pratapjejhavani, Dr. Rajendra Patil, Dr. B C Jain.

Table 2: Adverse events reported for cefpodoxime proxetil/ofloxacin combination

<table>
<thead>
<tr>
<th>Adverse event (total)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>6 (0.1)</td>
</tr>
<tr>
<td>Decreased appetite</td>
<td>2 (0.0)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>5 (0.1)</td>
</tr>
<tr>
<td>Nausea</td>
<td>3 (0.0)</td>
</tr>
<tr>
<td>Rash</td>
<td>2 (0.0)</td>
</tr>
<tr>
<td>Gastritis</td>
<td>6 (0.1)</td>
</tr>
<tr>
<td>Metal taste</td>
<td>1 (0.0)</td>
</tr>
<tr>
<td>Giddiness</td>
<td>1 (0.0)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>3 (0.0)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>1 (0.0)</td>
</tr>
<tr>
<td>Total</td>
<td>30 (0.5)</td>
</tr>
</tbody>
</table>

How to cite this article: Agrawal SS, Bhagat SB, Krishnaprasad K. Retrospective Cohort Study Analyzing Clinical Utility of Cefpodoxime-ofloxacin Combination in Patients with Community-acquired Infection at Different Outpatient Setting across India. Int J Sci Stud 2017;5(1):180-183.

Source of Support: Nil, Conflict of Interest: None declared.
Mortality Pattern of Children Admitted In Rural Medical College

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Abstract

Introduction: Childhood mortality is a sensitive health indicator and its pattern in the given area is important for policymaking.

Materials and Methods: This is a retrospective study done using hospital records. Deaths among children admitted during the period of 2 years from January 2014 to December 2015 analyzed.

Results: Total admission during the study period was 7227 with total deaths 114 (1.58%); out of 114, 74 (64.9%) were infants and 20 (17.5%) died in age group 1-5 years and 20 (17.5%) died in age group >5 years. The common cause of infant death was septicemia. Pneumonia is the leading cause in 1-5 years. Central nervous system (CNS) infection was the most common cause of mortality in more than 5 years age group.

Conclusion: Most of the death occurred in infants. Infections are the leading cause of death in all age groups. Exclusive breastfeeding, nutritional care, and immunization are the effective ways to decrease childhood mortality.

Key words: Childhood mortality, Infants, Pneumonia, Sepsis

INTRODUCTION

Mortality in children is an important indicator of the state health and development of the country.\textsuperscript{1} In countries like India with heterogeneous population, the etiology may vary widely with different regions. Knowledge about this varied pattern of diseases and their fatality rate is essential for the policy makers to make region-specific plans. The study area is a rural medical college serving predominately rural population and adjoining hill areas. In this context, this study was done to analyze the mortality pattern of the children admitted in the hospital for 1 year.

MATERIALS AND METHODS

This is a retrospective study done using the hospital records. Government Theni Medical College is a teaching tertiary care hospital in Tamil Nadu, India. This study was done at Department of Paediatrics, Government Theni Medical College. The study period was for 2 years from January 2014 to December 2015. The study population included all children of age from 1 month to 12 years admitted in the pediatric ward during the study period. As the hospital contains separate surgical and burns ward, children admitted for surgical conditions and burns are excluded from the study. All pediatric deaths during the study period were analyzed according to age, sex, etiology, and duration of stay. A pediatrician is available for round - The clock in the ward under the guidance of senior consultants. The diagnosis and cause of death were largely clinically based with supportive laboratory results. Data were collected from the hospital admission and death register. Data collected was entered into a spreadsheet using statistical package for the social sciences (SPSS) software package. Descriptive statistics was used to analyze the obtained data.

RESULTS

A total of 7227 children comprising 4393 (60.78%) and 2834 (39.22%) of females were admitted in the Department of Paediatrics from January 2014 to December 2015.

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During this 2-year period, 114 children died with an overall mortality of 1.58%.

Overall, mortality among admitted males and females were 1.34% and 1.94%, respectively (Table 1). Male: female ratio in age group 1 m to <1 year, 1-5 years, and >5 years were 1.5:1, 1.5:1, 1.3:1, 1:2.3, respectively (Table 2).

Out of total 114 pediatric deaths, 74 (64.9%) were infants and 20 (17.5%) died in age group 1-5 years and 20 (17.5%) died in age group >5 years (Table 3).

The common cause of infant death was septicemia, congenital heart disease, and respiratory tract infection followed by acute encephalitis syndrome (Table 4). Septicemia (25 cases) was the leading cause of death among infants. 14 infants having congenital heart disease including cyanotic and acyanotic died within the study period. CNS infection was the cause for 10 infant deaths. Etiological classification was given in Table 4.

Pneumonia is the most common cause of death in 1-5 years. Other important causes of mortality in the age group of 1-5 years were sepsis, acute encephalitis syndrome, and congenital heart disease (Table 5).

<table>
<thead>
<tr>
<th>Table 1: Sex distribution</th>
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<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
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<table>
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<tr>
<th>Table 2: Age distribution</th>
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<tbody>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>&lt;1</td>
</tr>
<tr>
<td>1-5</td>
</tr>
<tr>
<td>&gt;5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Mortality pattern in infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
</tr>
<tr>
<td>Septicemia</td>
</tr>
<tr>
<td>Congenital heart disease</td>
</tr>
<tr>
<td>Pneumonia</td>
</tr>
<tr>
<td>AES/meningitis</td>
</tr>
<tr>
<td>Intracranial bleed/late HDN</td>
</tr>
<tr>
<td>Myocarditis/DCM</td>
</tr>
<tr>
<td>CVT</td>
</tr>
<tr>
<td>Osteoporosis with anemia</td>
</tr>
<tr>
<td>Congenital cystic adenomatoid malformation</td>
</tr>
<tr>
<td>Poisoning</td>
</tr>
<tr>
<td>Hepatic encephalopathy</td>
</tr>
</tbody>
</table>

In age group >5 years, CNS infection is the leading cause followed by seizures, poisoning, sepsis, and hepatic encephalopathy. Children died of seizures had chronic neurological diseases such as cerebral palsy and postmeningitic sequale (Table 5).

About 57 out of 114 deaths (50%) occurred within 24 h of admission. 30 died within 72 h (26.3%). 15 died in four to seven of admission (13.2%). 12 child stayed more than 7 days before death (10.5%).

**DISCUSSION**

The number of admissions was more in males (4393) than females (2894). This is similar to the finding by Patil et al.², Roy et al.³ and Singhi et al.⁴ This finding was explained in previous studies in developing countries by two factors, the susceptibility of male child for infection and more care seeking for male child. These factors need more exploration by further studies.

After neonatal period, the risk of death in pediatric age group is highest during the post-neonatal period and infancy. In this study, approximately, 57.95% infants died out of total deaths in all age groups, indicating that the risk of death was highest in this age group this is similar to studies Charles et al.⁵ and Naik et al.⁶ Leading cause of death in this age group is sepsis. This finding emphasizes...
Selvakumar and Reghupathy: Mortality Pattern in Children

the need of immunization, exclusive breastfeeding, and appropriate initiation of complementary feeds.

Deaths due to congenital heart diseases and Myocarditis are higher than other studies. This finding needs further studies on incidence of congenital heart disease, the prevalence of consanguineous marriage and health seeking behavior of the parents.

CNS infection in the form of acute encephalitic syndrome, meningitis was common in all age group and is leading case in children more than 5 years of age. It is similar to other studies like Kataki et al. In this study, pediatric deaths (114) in relation to total pediatric admissions (7227) in one-year period showed overall mortality of pediatric patient in this study was 1.58% and is comparable with Singhi et al. study (2.7%).

When compared with the rate of admission, mortality is comparatively more in female children in all age group Godale et al. This may be due to the gender discrimination and is similar to studies such as Godale et al. About 50% of pediatric deaths occurred within 24 h of admission, which could be attributed to delay transportation of patients and late health seeking tendency. It was noted in most of the previous studies like Roy et al.

CONCLUSION

Overall, mortality is 1.58% of total admissions. Most of the death occurred in infants. Infections are the leading cause of death in all age group. Exclusive breastfeeding, proper complementary feeding, immunization, early health seeking, and health education will significantly reduce childhood mortality.

REFERENCES

Variations in the Shape of the Suprascapular Notch in Dry Human Scapula: An Anatomical Study

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Abstract

Introduction: The suprascapular notch is a regular feature of the superior border of the scapula, medial to the root of the coracoid process. Usually, this notch is converted into a foramen by the attachment of the superior transverse scapular ligament to its edges. The suprascapular nerve passes through this foramen while the suprascapular vessels pass above the ligament.

Materials and Methods: The study was conducted on 258 dry human scapula (131 right and 127 left) obtained from the Department of Anatomy, Jorhat Medical College, Jorhat and Department of Anatomy, Assam Medical College, Dibrugarh, Assam. The scapulae were examined macroscopically for their shape and data recorded.

Result: It was found that the suprascapular notch presents with various shapes such as U, V, J, and slight indentation. Even it could be absent in a scapula and this could be a reason behind the suprascapular nerve entrapment syndrome. In this study, we found U-shaped notch in 104 (40.31%) scapulae, V-shaped notch in 20 (7.75%), and J-shaped notch in 55 (21.31%) scapulae. 45 (17.44%) scapulae were without any notch. In 26 (10.07%) scapula there was only a slight indentation at the site of the suprascapular notch. In 8 (3.1%) scapula, the superior transverse scapular ligament was completely ossified, and the notch was converted into a foramen.

Conclusion: Knowledge about various shapes of the suprascapular notch will definitely help the clinicians while dealing with patients coming with signs and symptoms of suprascapular nerve entrapment syndrome. The suprascapular nerve is commonly compressed when the notch is V-shaped or is absent in a scapula.

Key words: Coracoid process, Entrapment syndrome, Indentation, Scapula, Suprascapular notch, Suprascapular foramen, Superior transverse scapular ligament

INTRODUCTION

The scapula is a flat triangular piece of bone that lies on the posterolateral aspect of the thoracic cage and extend vertically from the second to the seventh rib. It has three borders (superior, medial, and lateral) and three angles (superior, inferior, and lateral). The superior border extends from the superior angle to the lateral angle. It is the thinnest and the shortest of the three borders. Near the root of the coracoid process, the superior border presents a notch called the suprascapular notch. This notch is converted into a foramen, called the suprascapular foramen, by the attachment of the superior transverse scapular ligament to its edges.¹ After arising from the upper trunk of the brachial plexus, the suprascapular nerve passes through this foramen and supplies the supraspinatus muscle and then descends lateral to the spine of the scapula along with the suprascapular vessels to supply the infraspinatus muscle. It also gives a twig to the shoulder joint.² According to Khan,³ the suprascapular notch is frequently bridged by bone. Overhead abduction of the shoulder joint exert traction on the suprascapular nerve present in the vicinity and leads to its compression.

Studies reveal that the shape of the suprascapular notch is variable. It could be U-shaped or J-shaped or V-shaped or could be represented by a slight indentation only, or it could be absent, or it could be converted into a foramen by complete ossification of the superior transverse scapular ligament.⁴⁻⁹ As the suprascapular
nerve passes through the suprascapular foramen, it could be compressed due to variations in the shape of the suprascapular notch.

The aim of this study is to evaluate the variations in the shape of the suprascapular notch in the population of Assam and to compare it with the findings of the previous studies carried out worldwide.

**MATERIALS AND METHODS**

This study was conducted on 258 dry human scapulae collected from the Department of Anatomy, Jorhat Medical College, Jorhat and the Department of Anatomy, Assam Medical College, Dibrugarh, Assam. We also procured scapula from the 1st year medical students. All the scapulae were examined macroscopically, first, for the presence or absence of the suprascapular notch and second, for the shape of the notch. The data were recorded and compared with the previous studies.

**Inclusion and Exclusion Criteria**

Scapulae with damaged superior border were excluded from the study.

**RESULTS**

In this study was conducted on 258 dry human scapula, we found that majority of the scapulae 104 (40.31%) had U-shaped suprascapular notch followed by 55 (21.31%) scapulae with J-shaped notch. V-shaped notch was present in 20 (7.75%) scapulae. 45 (17.44%) scapula was without any notch. In 26 (10.07%) scapula, there was only a slight indentation at the site of the suprascapular notch. Complete ossification of the superior transverse scapular ligament was observed in 8 (3.1%) scapula (Figures 1-6).

**DISCUSSION**

Review of literature suggests that many studies had been conducted in the past regarding the variations in the shape of the suprascapular notch. The suprascapular nerve entrapment is more common with a narrow V-shaped notch. A reduction in the height of the suprascapular foramen may predispose to entrapment of the suprascapular nerve and thus cause entrapment neuropathy. Iqbal et al.,6 Nagaraj et al.,7 and Soni et al.,8 and many other authors have classified the suprascapular notch into various types on the basis of its shape as U, V, and J. Soni et al. have further included four more conditions in their classification. They are - indentation, absent notch, partial ossification of the suprascapular ligament, and complete ossification of the suprascapular ligament. Rengachary et al.,9 classified the suprascapular notch into six types based on the inferior shape of the suprascapular
notch as well as the degree of ossification of the superior transverse scapular ligament. In this study, we have mainly followed the classification used by Nagaraj et al. to record our data (Table 1).

Next, we compared our data with that of others (Table 2). We found that the most common shape of the suprascapular notch was U shape (40.31%). Our finding corresponds with the findings of Vandana, Patel et al., and Chhabra et al. who too found the U-shaped notch to be more common than other shapes in their studies. We found the J-shaped suprascapular notch to be 21.31% which is similar to the reports of Iqbal et al., Patel et al., and Chhabra et al. who too found the U-shaped notch to be more common than other shapes in their studies. We found the J-shaped suprascapular notch to be 21.31% which is similar to the reports of Iqbal et al. and Patel et al. In 10.07% of our specimens, we found only a slight indentation at the site where there should have been a well-defined suprascapular notch. On comparing, we found that our value is much higher than the findings of Nagaraj (2.88%), Vandana (4.5%), and Soni et al. (3%) but less than as reported by Iqbal et al. (33.5%). We found complete ossification of the transverse scapular ligament in 3.1% scapula. Our finding correlates with the reports of Soni et al. (3%), Patel (3.75%), Sinkeet et al. (2.9%), and Nagaraj (2.88%). We found the absence of the suprascapular notch on the superior border of the scapula in 17.44% cases. Our finding is very close to the reports of Kannan (20%), Iqbal (22.5%), Sinkeet et al. (22.2%), and Nagaraj (23%).

**CONCLUSION**

Knowledge of anatomical variations in the shape of the suprascapular notch should be kept in mind while dealing with patients coming with sign and symptoms of suprascapular nerve entrapment syndrome. This study is a humble effort to contribute to the minimum data available regarding suprascapular notch variation in the population of Northeast India.

**Table 1: Showing the types of suprascapular notch**

<table>
<thead>
<tr>
<th>Shape of notch</th>
<th>Number of scapula (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-shaped</td>
<td>104 (40.31)</td>
</tr>
<tr>
<td>V-shaped</td>
<td>20 (7.75)</td>
</tr>
<tr>
<td>J-shaped</td>
<td>55 (21.31)</td>
</tr>
<tr>
<td>Slight indentation</td>
<td>26 (10.07)</td>
</tr>
<tr>
<td>Absent notch</td>
<td>45 (17.44)</td>
</tr>
<tr>
<td>Complete ossification of suprascapular ligament</td>
<td>8 (3.1)</td>
</tr>
</tbody>
</table>

**Table 2: Comparison of various studies on the types of the suprascapular notch**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>U</th>
<th>V</th>
<th>J</th>
<th>Slight indentation</th>
<th>Completely ossified superior transverse ligament</th>
<th>Absent notch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iqbal et al.</td>
<td>2010</td>
<td>13.2</td>
<td>20</td>
<td>22</td>
<td>33.5</td>
<td>-</td>
<td>22.5</td>
</tr>
<tr>
<td>Sinkeet et al.</td>
<td>2010</td>
<td>29.6</td>
<td>5.18</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.9</td>
</tr>
<tr>
<td>Soni et al.</td>
<td>2012</td>
<td>58</td>
<td>7</td>
<td>27</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Vasudha et al.</td>
<td>2013</td>
<td>12.16</td>
<td>-</td>
<td>19.13</td>
<td>7.82</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Vandana</td>
<td>2013</td>
<td>35</td>
<td>5.2</td>
<td>34.3</td>
<td>4.5</td>
<td>-</td>
<td>4.5</td>
</tr>
<tr>
<td>Patel et al.</td>
<td>2013</td>
<td>47.5</td>
<td>7.50</td>
<td>35</td>
<td>Nil</td>
<td>-3.75</td>
<td>6.25</td>
</tr>
<tr>
<td>Kannan et al.</td>
<td>2014</td>
<td>52</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Nagaraj et al.</td>
<td>2014</td>
<td>26.92</td>
<td>1.92</td>
<td>43.26</td>
<td>2.88</td>
<td>-2.4</td>
<td>23</td>
</tr>
<tr>
<td>Chhabra et al.</td>
<td>2016</td>
<td>46</td>
<td>24.6</td>
<td>15.9</td>
<td>-</td>
<td>-2.4</td>
<td>0.79</td>
</tr>
<tr>
<td>Present study</td>
<td>2017</td>
<td>40.31</td>
<td>7.75</td>
<td>21.31</td>
<td>10.07</td>
<td>3.1</td>
<td>17.44</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENT

Authors would like to thank Mr. Hridoyjit Hazarika, Mrs. Jihom Shyam and Mr. Sanju Balmiki for their help.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Magnetic Resonance Imaging of Sonographically Indeterminate Adnexal Masses: A Reliable Diagnostic Tool to Detect Benign and Malignant Lesion

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Abstract

Introduction: Adnexal masses are a quite common clinical problem. Around 5-10% women undergo surgery for suspicious adnexal masses, but only 25% or less are malignant.

Aims and Objectives: To study the sensitivity and specificity of magnetic resonance imaging (MRI) in differentiating sonographically indeterminate adnexal masses into benign and malignant, in considering biopsy as the reference standard.

Materials and Methods: Our study is observational, analytical study with cross-sectional, data collection done from February 2015 to September 2016. 58 patients with sonographically indeterminate adnexal mass were selected as the study population. On the basis of ultrasound, we studied the distinguishing features of benignity and malignancy, origin and tissue characterization in MRI and the final diagnosis was confirmed with histopathology.

Results: On MRI out of 58 masses, we diagnosed 30 masses as benign and 28 masses as malignant, however, on histopathological examination it was 27 and 31, respectively. The overall sensitivity and specificity of MRI to differentiate benign and malignant adnexal mass was 91.1% and 100%, respectively. The positive predictive value, negative predictive value, and accuracy were 100%, 90%, and 94.4%, respectively.

Conclusion: In our study, MRI proved to be highly sensitive and specific in differentiating malignant from benign adnexal masses which were indeterminate on ultrasonography examination. Thus can be used to categorize indeterminate masses into benign or malignant and help the surgeon to plan surgery in the required persons, whereas those with benign masses can undergo conservative management.

Key words: Adnexal masses, Magnetic resonance imaging, Ultrasonographically indeterminate masses

INTRODUCTION

Adnexal masses are a quite common clinical problem. Around 5-10% women undergo surgery for suspicious adnexal masses, but only 25% or less are malignant.
characterizing the tissue content into benign or malignant and hence of great value for a clinician.

**MATERIALS AND METHODS**

Our study is observational (diagnostic analytical), prospective study with cross sectional data collection in a period of February 2015 - September 2016 done at Department of radio diagnosis Pt. JNM Medical College, Raipur (Chhattisgarh).

After obtaining approval from the ethics committee, we enrolled women having sonographically indeterminate pelvic mass. They were sent for pelvic MRI. The inclusion criteria of the study were, women of any age group having indeterminate adnexal masses. We identified a total of 72 indeterminate masses. We excluded 14 mass on the basis of exclusion criteria which were unwillingness to take part in study, claustrophobia and deranged renal function.

Masses were considered sonographically indeterminate when the origin of mass was uncertain due to its large size, suboptimal image quality due to large body habitus, excessive bowel gas, shadowing from fibroids, poor pelvic detail, or lack of tissue specificity (purely solid mass, purely cystic mass, and complex cystic mass). “Lack of tissue specificity” for solid, cystic, or complex cystic masses implies that the finding is not specific for any one diagnosis and can be seen in a wide spectrum of lesions, including both benign and malignant entities. Finally, 58 sonographically indeterminate adnexal masses composed the final study population. The mean interval between sonography and MRI was 18 days (Range, 5-90 days). The final diagnosis for each of the 58 masses was established by histopathology.

The selection of study population as sonographically indeterminate adnexal mass was done by the two experienced radiologist using Toshiba Aplio MX ultrasound machine having a high-frequency small part probe and low-frequency curvilinear probe and transvaginal scan probe.

All 58 MRI studies were 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 (45mT/m @ 200T/m/s). Zero helium boil-off technology.

The following sequences were performed: T2 weighted images (T2WI) in the axial, coronal and sagittal plane, a slice thickness of 3 mm, a field of view (FOV) of 200 mm and repetition time/time to echo (TR/TE) - 3500/86, voxel size 0.5×0.5×3 mm. Fat-Suppressed (FS) T2WI MR protocol was: TR, 1600 ms; TE, 95 ms; and thickness, 5.0 mm. Voxel size 0.6×0.6×3 mm, FOV of 204. Short T1 inversion recovery (STIR) images in the axial plane, a slice thickness of 3 mm, a FOV of 180 mm and TR/TE - 5150/38, voxel size 0.6×0.6×3 mm. T1WI in the axial plane, a slice thickness of 3 mm a FOV of 200 mm and TR/TE - 550/12, voxel size 0.6×0.6×3 mm. Post contrast Gadolinium T1 Axial, sagittal and coronal images a slice thickness of 3 mm a FOV of 200 mm and TR/TE - 600/12, voxel size 0.8×0.8×3 mm. Susceptibility weighted imaging sequence taken at in axial plane, a slice thickness of 2.5 mm a FOV of 220 mm and TR/TE - 27/20, voxel size 0.4×0.4×2.5 mm.

The examiners were blinded to the sonography findings. We assessed each adnexal masses in following points: (1) Origin of mass (ovarian, uterine, or extra ovarian), (2) size, shape, and margin of lesion, (3) number of masses, and (4) lesion and tissue content (solid, purely cystic, complex or cystic, and solid). The signal characteristics of the mass on T1, T2-WI, STIR, gradient recalled echo (GRE) were documented for determining tissue content and tissue characterization, accordingly presence of fat, hemorrhage, and fibrous or leiomyomatous tissue was recorded. If there is a fatty component in mass lesion, it gives a bright signal on T1-WI and lost signal intensity on fat-suppressed T2-weighted sequences. Hemorrhage was easily identified on GRE sequences appeared as blooming and also by high signal intensity on both non-fat-suppressed and fat-suppressed T1-WI. Fibrous and leiomyomatous tissue was defined as being hypointense to skeletal muscle on T2-WI. A thick enhancing wall, internal enhancement, septations, papillary projection, necrosis, lobulation, and mural nodules within the mass were used to help characterize a mass as benign or malignant. The presence of an abnormal amount of pelvic fluid, lymph node enlargement, and peritoneal metastases was also recorded. Final impressions of benign or malignant mass were given on the basis of above-described findings.

**Statistical Evaluation**

The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of a correct MRI diagnosis of a mass (malignant or benign), as determined by the final diagnosis, were calculated using two by two contingency tables. Chi-square/Fisher exact test has been used to find the significance of study parameters on a categorical scale between two or more groups.

**RESULTS**

On histopathological examination, we detected 27 indeterminate mass as benign and 31 as malignant.
Specific diagnoses are listed in (Table 1). The mean diameter of all 58 masses was 9.3 cm (range, 2.5-27 cm).

On MRI 30 masses were diagnosed benign and 28 masses were diagnosed as malignant, however, the true diagnosis of benign and malignant was 27 and 31, respectively. All the diagnosis were confirmed by histopathology however immunohistochemistry were required for specific diagnosis in (n = 16) malignant cases and (n = 3) in benign cases. The MRI diagnosis of three masses that wrongly diagnosed as benign was cystadenoma, inflammatory ovarian mass, and Brenner’s tumor. Thus, on the basis of MRI we were unable to identify three malignant mass correctly (Table 2). The sensitivity of MRI for correctly identifying a malignant lesion was 91.4%, and the specificity for correctly making a benign diagnosis was 100%. The PPV, NPV, and accuracy of the test is 100%, 90%, and 94.8%, respectively. Various parameters were chosen to describe to differentiate the benign from the malignant mass. A significant association was found between malignancy and poorly defined lesions (P = 0.013), heterogeneous and intense enhancement (P < 0.0001), increased (>3 mm) septal thickness (P < 0.0001), lobulated lesion (P = 0.02), necrosis (P = 0.004), papillary projections (P = 0.017), metastasis (0.029), and ascites (0.006) show high association with malignant lesion.

In sonography, the origin of 27 mass was not identified but was correctly identified on MRI as 2 uterine masses, 43 ovarian masses (right and left), and 3 extra ovarian-extra uterine lesions. The origin of 10 adnexal mass could not be identified on MRI also (Table 3). These masses were very large with a mean diameter of 13.9 cm range (11.1-27 cm).

Out of 58 adnexal mass 21 masses were solid cystic or complex cystic, 17 masses were pure solid, and 20 masses were cystic. Solid masses and solid cystic masses mainly contribute to the malignant lesion (38.7 and 51.6%, respectively) of total malignant lesions. Cystic masses with thick septa (3.38 mm) became serous cystadenocarcinoma (Figure 1). Some solid benign masses were fibroid, fibrothecoma and torsion of ovary. Solid lobulated mass with characteristic fibrovascular septa in a young woman is suggestive of dysgerminoma (Figure 2). Fat, hemorrhage and T2 hypointensity of the lesion shows strong association (P = 0.049) with benignity. These lesions were mainly hemorrhagic cyst, dermoid cyst having fat (Figure 3), fibroids and fibrothecoma showed T2 hypointensity.

**DISCUSSION**

In our study, most common age group of presentation with adnexal mass was ≤30 years and also had the highest frequency of malignancy accounting 41% of total malignant tumors. The age ranges from 13 to 80 years. Comparison of age distribution between benign and malignant lesions was performed using Fischer’s exact test. Our study shows no any correlation between increasing age and incidence of malignancy. This finding goes against the previous studies done by
Jeong et al. and Jung et al. in which they observed that epithelial tumor is the most common tumor and serous cystadenocarcinoma is the most common type.\(^3\) Jung et al. also concluded in their study that epithelial tumor is the most common ovarian neoplasm.\(^4\)

In our study, we divided adnexal masses into two standard groups of diameter \(\leq 4\) cm and \(>4\) cm. No correlation was seen \((P = 0.233)\) with size and incidence of malignancy of adnexal mass. This finding does not match with the similar studies\(^5\) which showed smaller adnexal mass is less likely to be carcinoma ovary and large incidentally detected mass with mean size 6.5 cm is mostly malignant similarly Ahmad et al. and Valentini et al. concluded that size \(>4\) cm is associated with malignancy.\(^6,7\) The probable cause of the discrepancy between our study and previous studies may be the unequal distribution of study population in \(\leq 4\) cm group \((n = 4)\) and \(>4\) cm group \((n = 54)\). However, our study shows that \(\leq 4\) cm group is having only four masses in which three were benign.

The shape/margin was divided into two groups as well defined and poorly defined on the basis of delineation of margin. Significantly higher frequency of poorly defined lesions in malignant and well-defined lesions in benign lesions was noted \((P = 0.013)\). We had total 18 poorly defined mass in our study out of which 14 showed malignancy.\(^7\) Comparison of morphology of lesion as detected on MRI between benign and malignant lesion was performed. Significantly higher frequency of solid and solid cystic consistency in malignant lesions and that of cystic consistency in benign lesion was noted \((P < 0.0001)\). We found the frequency of malignancy was highest in the solid cystic tumor (51.6%) followed by solid tumors (38.7%). This finding is consistent with the previous study of McDonald et al. in which they found that high risk of ovarian malignancy as those with an adnexal mass having complex or solid morphology.\(^8,9\)

Septal thickness is an important criteria to differentiate between benign and malignant lesions in complex cystic lesions. 3 mm was taken as cutoff to divide into two groups as thin and thick septa. In our study, 17 tumors were showing thick septa out of which 15 were malignant, i.e., 88.2% of tumors with thick septa were malignant. Similarly, 16 tumors were showing thin septations; out of which 15 were benign, i.e., 93.7% tumors with thin septa were benign. Significantly higher frequency of increased septal thickness \((>3\) mm) in the malignant lesion and decreases septal thickness \((<3\) mm) in benign lesion was observed \((P < 0.0001)\). This result is very similar to the previous studies done by Hricak et al. in which significant association \((P < 0.001)\) seen between malignancy and septal thickness of more than 3 mm.\(^10\)

<table>
<thead>
<tr>
<th>Origin of lesion</th>
<th>Histopathological diagnosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad ligament</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>0.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Left ovary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>33.3</td>
<td>25.8</td>
</tr>
<tr>
<td>Not determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>14.8</td>
<td>19.4</td>
</tr>
<tr>
<td>Pelvic floor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>0.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Right ovary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>40.7</td>
<td>45.2</td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>11.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>% within histopathological diagnosis</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

\(a\) 24-years-old woman presented with lower abdominal pain, menstrual irregularity. T2WI sagittal image shows large abdominopelvic cystic lesion with thick septations and subtle papillary projection, \(b\) T1WI and, \(c\) T1C+FS axial images show no contrast enhancement of septa, \(d\) histopathology \(\times 10\) low power slide show epithelial pluristratification and mild atypical suggestive of serous cystadenocarcinoma.
Various findings on MRI characterization between benign and malignant lesion were performed using Chi-square/ Fischer’s exact test. Significantly higher frequency of lobulated lesion ($P = 0.02$), necrosis (0.004), papillary projections (0.017), metastasis (0.029), and ascites (0.006) was noted in malignant lesion. These associations are very similar to the previous study like Valentini et al. in 2012 proved significant correlation between malignancy and solid part of the mass with heterogeneous enhancement pattern, cystic mass with vegetation and internal structures, thickness of wall or septa $>3$ mm, lobulated mass, tiny amorphous calcifications, necrosis, papillary projections, tumor vessels with heterogeneous enhancement pattern, ascites, metastasis, and lymphadenopathy. Yamashita et al. developed a model of a computer-assisted diagnosis and identified system was developed with the logistic regression analysis. 87% of the lesions accurately as benign or malignant. Hricak et al. demonstrated the conspicuity ratings were significantly higher on the gadolinium-enhanced images ($P < 0.01$) for classification of a predominantly solid or cystic lesion, determination of wall and septal thicknesses, detection of vegetations in a cystic lesion and identification of necrosis in a solid lesion. Significantly higher frequency of heterogeneous and intense enhancement in the malignant lesion and that of mild enhancement in benign lesion was noted ($P < 0.0001$). We found 83.3% intensely enhancing tumors and 71% heterogeneously enhancing tumors were malignant. This is in agreement with other studies. In our study, 45% of malignant lesions were from right ovary, 30% were from left. Whereas we were unable to determine the origin in 20% of malignant cases as entire lesions were very large in size and bilateral ovaries were not separately visualized. No significant difference in frequency distribution was found ($P = 0.614$).

There was strong evidence of a relationship between MRI and pathological examination for diagnosis of the malignant lesion ($P < 0.0001$). The sensitivity of MRI for diagnosis of the malignant lesion was found to be 91.1%, specificity was found to be 100%, PPV was found to be 100.00% and NPV was 90.00%. Accuracy was found to be 94.82%. These findings are very similar to the previous well-known studies.

**CONCLUSION**

In our study, MRI proved to be highly sensitive and accurate in differentiating benign and malignant lesions of adnexal masses which were indeterminate on ultrasonography examination. Thus, MRI can be considered as second most confirmatory tool followed by tissue diagnosis in women with indeterminate masses.

**REFERENCES**

4. Jung SE, Lee JM, Rha SE, Byun JY, Jung JI, Hahn ST. CT and MR imaging
Kumar, et al.: Magnetic Resonance Imaging Evaluation of Sonographically Indeterminate Adnexal Masses


Source of Support: Nil, Conflict of Interest: None declared.
Prevalence of Antenatal Steroids Coverage in Preterm Labor and Its Influence on Neonatal Respiratory Morbidity and Mortality in Kanyakumari District

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Abstract

Introduction: Antenatal steroid treatment for women who are at risk of preterm delivery has emerged as the most effective intervention for the prevention of respiratory distress syndrome, reducing early neonatal mortality and morbidity.

Aim: The aim of the study is to study the prevalence of antenatal steroid coverage to preterm <34-6/7 weeks admitted in our neonatal intensive care unit (NICU) and its influence on respiratory morbidity and mortality.

Materials and Methods: This study is a retrospective analysis of antenatal steroid coverage to preterm admitted during 1-year period in our NICU from January 2016 to December 2016. Preterm <34-6/7 weeks were included in the study results were analyzed using statistical graphic methods.

Result: A total of 163 preterm <34-6/7 weeks were analyzed in the study. Dexamethasone is the standard antenatal steroid used in our institution. About 13.4% (22/163) of preterm received a complete course of antenatal steroid. Nearly 38.65% (63/163) did not receive even a single dose of antenatal steroid. Nearly 44.8% (73/163) received an incomplete course of antenatal steroid. About 3% of preterm received additional dose of antenatal steroid. Among the no steroid group, incidence of respiratory distress and death were higher compared to the complete course of steroid group.

Conclusion: Reduction in the morbidity and mortality in preterm neonates is facilitated by timely administration of antenatal steroids. Hence, empowering health-care professional about knowledge of antenatal steroid in the prevention of preterm morbidity and mortality is a major contributory factor in further bringing down the neonatal mortality rate in our country.

Key words: Antenatal steroid, Neonatal mortality, Newborn care, Preterm birth, Respiratory distress syndrome

INTRODUCTION

Respiratory distress syndrome (RDS) associated with prematurity accounts for nearly 1 million neonatal deaths annually in developing countries.¹ Deficient surfactant production in the immature preterm lung delivered before 34 weeks leads to alveolar collapse and finally respiratory failure and death. Prenatal corticosteroid administration to women at risk for preterm delivery decreases the incidence and severity of RDS and neonatal death by accelerating fetal lung maturation.² Glucocorticosteroids stimulates the production of surfactant-associated proteins and increase phospholipids synthesis by enhancing the activity of phosphatidylycholine. Antenatal steroids used in anticipated preterm labor is a low-cost effective intervention for prevention of RDS-related preterm death. Antenatal steroids decrease the incidence of preterm neonatal mortality by 38% and 34% reduction in RDS in high-income countries.³ There is high-quality evidence of substantial mortality benefit of antenatal steroids in developing countries than in developed countries.⁴ The Cochrane meta-analysis has suggested that the need for

Access this article online

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

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further trial with antenatal steroids in higher income countries is minimal, but data are sparse in lower income settings where the infection rate is higher and the benefit cannot be extrapolated from higher income countries. The coverage of antenatal steroids in the majority of the middle- and low-income countries remains very low (10%) in compared to high-income countries (95%) where many of the preterm respiratory distress-related deaths occur. The Cochrane review on antenatal steroids suggests that betamethasone causes a large reduction in RDS compared to the dexamethasone. Dexamethasone is the recommended antenatal steroid by the Ministry of Health and Family Welfare of India compared to betamethasone due to its component advantage absent in the latter. The protocol for administration of dexamethasone is 6 mg, 12th hourly interval for 4 doses and 24 h gap after the last dose which offers the maximum morbidity and mortality benefit.

**Aim**
The aim of the study is to study the prevalence of antenatal steroid coverage to preterm <34-6/7 weeks admitted in our neonatal care unit (NICU) and its influence on respiratory morbidity and mortality.

**MATERIALS AND METHODS**
This retrospective study was conducted in the Department of Neonatology in Kanyakumari Medical College Hospital. Preterm <34-6/7 weeks admitted in our NICU were analyzed for the study. Late preterm and near-term babies were excluded from the study. Results were analyzed graphically by Tables 1-4 and Pie charts.

**RESULTS**
Steroid coverage to 163-admitted preterm babies are depicted in Tables 1-4.

**DISCUSSION**
We observed only 13.4% coverage of complete course of antenatal steroid in our study. This in comparison is very low compared to universal coverage in developed countries. The coverage rate of antenatal steroids in high-income countries is more than 90%. The antenatal steroid coverage in low-income countries ranges from 5% to 10%. About 6 studies conducted in Latin America concluded a coverage range between 4% and 71%. We too observed a low antenatal steroid coverage as observed by other studies. The coverage for incomplete course of antenatal steroid is quite high (44.8%) compared to complete course (13.4%). Short-time gap available for steroid administration to delivery, failure to give referral shot of steroid, lack of knowledge to give steroid after admission could be attributable to the poor coverage of antenatal steroid. Incomplete course is beneficial compared to no steroid in reduction of respiratory morbidities in preterm neonates. Elimian et al. have assessed the effectiveness of incomplete course of antenatal steroids compared to placebo and found to be associated with reduction in the need for intraventricular hemorrhage, neonatal death in preterm.

### Table 1: Number of doses received by preterm babies

<table>
<thead>
<tr>
<th>Number of antenatal steroid dose</th>
<th>Number of preterm babies received antenatal steroid</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>63</td>
<td>38.65</td>
</tr>
<tr>
<td>1</td>
<td>28</td>
<td>17.2</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>27.6</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>13.4</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### Table 2: Indications for the antenatal steroid admissions

<table>
<thead>
<tr>
<th>Indications for steroid administration</th>
<th>Number of babies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imminent preterm labor</td>
<td>102</td>
</tr>
<tr>
<td>PPROM</td>
<td>36</td>
</tr>
<tr>
<td>Severe PIH</td>
<td>6</td>
</tr>
<tr>
<td>No data available</td>
<td>19</td>
</tr>
</tbody>
</table>

PPROM: Preterm premature rupture of the membranes, PIH: Pregnancy-induced hypertension

### Table 3: The respiratory morbidity pattern and antenatal steroid coverage

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Complete course of steroid group (%)</th>
<th>Incomplete course of steroid group (%)</th>
<th>No steroid group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>8/22 (36.3)</td>
<td>45/73 (61.6)</td>
<td>43/63 (68.2)</td>
</tr>
<tr>
<td>Requirement for surfactant</td>
<td>3/96 (3.1)</td>
<td>13/96 (13.5)</td>
<td>20/96 (20.8)</td>
</tr>
</tbody>
</table>

RDS: Respiratory distress syndrome

### Table 4: Mortality pattern and antenatal steroid coverage

<table>
<thead>
<tr>
<th>Death in complete course of antenatal steroid group (%)</th>
<th>Death in no steroid group (%)</th>
<th>Death in incomplete course of antenatal steroid group (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/22 (0)</td>
<td>7/63 (11.1)</td>
<td>3/28 (10.7)</td>
</tr>
</tbody>
</table>
a low-resource setting. The incidence and requirement of surfactant was low in the complete course of steroid group (3.1%) compared to the no steroid (20.8%) and partial cover steroid group (13.5%) suggesting cost beneficial effect with full coverage. Evidence from Cochrane observed a significant reduction in serious adverse outcomes with antenatal steroids including perinatal death relative risk (RR) 0.72 (confidence interval [CI]: 0.58-0.89), neonatal death (RR: 0.69, 95% CI: 0.59-0.81), and RDS (RR: 0.66, 95% CI: 0.56-0.77).9 We observed a substantial reduction in morbidity and mortality similar to western trials with dexamethasone. Concurrent infection and other parameters which might influence morbidity and mortality in low-resource settings were not analyzed in our study which is a limitation of our study. Further randomized controlled studies are needed to assess the influence of antenatal steroid in low-income and community settings. We observed 3% of preterm receiving rescue doses of antenatal steroid. The effect of rescue doses is limited and its uses should be restricted after the primary course. Multiple courses, in fact, could have harmful neurodevelopmental effects in the baby.10 The multiple course of antenatal steroid for preterm birth trial found that the infants exposed to have decreased mortality and morbidity, but the weight and head circumference were smaller than the placebo. Hence, repeat dose should not be recommended as a routine.11

CONCLUSION

Reduction in the morbidity and mortality in preterm neonates is facilitated by timely administration of antenatal steroids. Hence, empowering health-care professional about knowledge of antenatal steroid in the prevention of preterm morbidity and mortality is a major contributory factor in further bringing down the neonatal mortality rate in our country. Further studies are needed to analyze the factor which prevents its universal implementation in the community level.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Prevention of Post-operative Nausea and Vomiting Following Laparoscopic Cholecystectomy

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Abstract

Background: Gallstone disease and its symptoms are frequently encountered in Indian population. Approximately, 80% of the gallstones are asymptomatic. Female sex, obesity, pregnancy, rapid weight loss, gallbladder stasis, and increasing age are a few risk factors for the development of gallstones.

Materials and Methods: This study, “A study on the role of levosulpiride in prevention of post-operative nausea and vomiting (PONV) following laparoscopic cholecystectomy,” was conducted for 1 year (November 2014-October 2015), in the Department of Surgery, Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu. Patients admitted in the Department of Surgery for elective laparoscopic cholecystectomy were enrolled in the study after fulfilling the eligibility criteria. The patients were allocated to 2 groups of 30 patients each on the basis of random sampling method.

Result: Pre-operative administration of injection levosulpiride 25 mg in patients undergoing elective laparoscopic cholecystectomy surgeries under general anesthesia significantly reduces the incidence of PONV.

Conclusion: It was hence seen to improve the quality of life in early stage of post-operative rehabilitation and also decreases the duration of hospital stay.

Key words: Cholecystectomy, Levosulpiride, Nausea

INTRODUCTION

Gallstone disease and its symptoms are frequently encountered in Indian population. Approximately, 80% of the gallstones are asymptomatic. Female sex, obesity, pregnancy, rapid weight loss, gallbladder stasis, and increasing age are a few risk factors for the development of gallstones. They usually present with symptoms like pain, dyspepsia or also can rarely lead to complications such as acute cholecystitis, common bile duct stones, and acute pancreatitis. The diagnosis is primarily based on the patients’ anamnesis of pain attacks and the presence of gall stones. Since 1980, the presence of gallstones has been diagnosed by ultrasonography.¹⁻¹⁵

The main treatment of gallstones is surgery. To live with gallstone disease during the waiting time for surgery, involves prolonged period of decreased health during which patients’ psychological and social life suffers in some degree. Delayed surgery puts patients at risk for developing acute complications, requiring hospital admission and urgent treatment.

There has been a reduction in morbidity, pain and fatigue postoperatively with laparoscopic surgery. Moreover, there is an obvious clinical advantage over the open surgery due to less metabolic stress response.¹⁶⁻²⁸

Laparoscopic cholecystectomy is one of the most common surgical procedures being performed in the world. The procedure is performed in steep head-up tilt, usually under general anaesthesia. To get access to abdominal cavity small
Incisions are made and working trochars are inserted. To get visibility and to dissect gall bladder, the abdominal cavity is inflated with gas (usually carbon dioxide \([\text{CO}_2]\)) called pneumoperitoneum. In this procedure intra-abdominal instruments are used, other incisions are used for optics, suction, electrocautery, etc.

The most frequent symptoms reported after laparoscopic cholecystectomy are pain, inability to ambulate and a high incidence of dyspepsia in immediate post-operative period, mostly in the form of nausea and vomiting (PONV), abdominal fullness and bloating.\(^{26,29-35}\)

Almost 30% of all patients undergoing general anesthesia experience PONV. It is a major distress within 24 h of surgery in 40-70% of patients undergoing laparoscopic cholecystectomy. Although the precise mechanism of PONV is still unknown, we believe that high frequency of PONV in patients undergoing laparoscopic operation may be due to pneumoperitoneum.

The vomiting center is an indiscrete area located in the lateral reticular formation of the medulla, which is responsible for controlling and coordinating nausea and vomiting. The center receives a wide range of afferent inputs from receptors in the gastrointestinal tract, peripheral pain receptors, the nucleus solitarius, vestibular system, the cerebral cortex, and the chemoreceptor trigger zone.

PONV is a common unwanted effect in patients undergoing laparoscopic cholecystectomy. PONV can be very distressing to the patient, sometimes more than the surgery itself. Several factors have been implicated specifically in laparoscopic cholecystectomy such as \(\text{CO}_2\) insufflation, distension of the abdomen and irritation of the diaphragm and other abdominal viscera. In addition, other factors have also been associated such as female gender, history of motion sickness, obesity, length of surgery, post-operative pain, use of opioids, and use of inhalational anesthetics like halothane.

PONV following laparoscopic cholecystectomy is a primary cause for delay in discharge from hospital. Furthermore, the nausea and vomiting may cause dehydration, electrolyte imbalance, disruption of surgical repair, and increase the perception of pain. These factors reduce the quality of life of the patients and interfere with continuation of curative therapy.

PONV complicates the lives of both patients and surgeons. A good outcome during surgery may be followed by a period of discomfort to patient in immediate post-operative period. The true incidence and specific etiology of PONV is difficult to determine because of the lack of a single stimulus of onset as well as the range of possible etiologies (medical, surgical, patient and anesthesia associated).\(^{36-48}\)

**MATERIALS AND METHODS**

The present study, “A study on the role of levosulpiride in prevention of PONV following Laparoscopic Cholecystectomy,” was conducted for 1 year (November 2014-October 2015), in the Department of Surgery, Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu. Approval for study was obtained from Ethical Committee. Patients admitted in the department of surgery for elective laparoscopic cholecystectomy were enrolled in the study after fulfilling the eligibility criteria. The patients were allocated to 2 groups of 30 patients each on the basis of random sampling method.

**Inclusion Criteria**
1. Patients posted for elective laparoscopic cholecystectomy surgeries.
2. Patients of either sex, between the age group 20 and 50 years.
3. Patients weighing between 40 and 70 kg.

**Exclusion Criteria**
1. Patient refusal.
2. Patients with known hypersensitivity or contraindications to study drug.
3. Patients coming for any emergency surgeries.
4. Patient age >50 years and <20 years.
5. Patients with a history of motion sickness.

**METHODOLOGY**

The patients were randomly allocated into 2 groups:
- **Group L:** Received injection. Levosulpiride 25 mg IV, just before surgery.
- **Group C:** Did not receive any medication.

Postoperatively, patients were advised to take rest and remain in the bed at least for the first 24 h. Other emetogenic analgesics and drugs were avoided for 24 h.

The number of episodes of nausea and vomiting and side effects of levosulpiride if any were assessed postoperatively for 24 h. The above findings were recorded in the following intervals: 0-4 h, 4-8 h, 8-12 h 12-24 h in the post-operative period and statistical analysis was done accordingly. Rescue anti emetic consisting of injection metoclopramide 10 mg IV was given after vomiting.
RESULTS

The present study, “A study on the role of levosulpiride in prevention of PONV following laparoscopic cholecystectomy,” was conducted for 1 year (November 2014-October 2015), in the Department of Surgery, Acharya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu. Approval for study was obtained from ethical committee. Patients admitted in the Department of Surgery for elective laparoscopic cholecystectomy were enrolled in the study after fulfilling the eligibility criteria. The patients were allocated to 2 groups of 30 patients each on the basis of random sampling method.

- Group L: Received injection. Levosulpiride 25 mg IV, just before surgery.
- Group C: Did not receive any medication.

The outcome of 2 groups was assessed and observations were made.

The patients included in control group were in range of 23-50 years and in levosulpiride group were in range of 21-50 years. The youngest patient in the study was 21 years, and the oldest was 50 (Table 1a and b).

The majority of patients in each group were males. The number of males and females in control group were 17 and 13, respectively, and in levosulpiride group were 18 and 12, respectively (Table 2).

The mean weight of patients in control group was 58.27 ± 8.14 and that of patients in levosulpiride group was 59.67 ± 6.91 (Table 3).

The most common clinical presentation in both the groups was pain in the right hypochondrium (RHC) (Table 4).

The most common comorbidity in both the groups was type 2 diabetes mellitus (Table 5).

The ultrasonography findings of 18 patients in control group consisted of multiple calculi, 11 had a solitary stone and 1 had sludge. In levosulpiride group, 21 patients had multiple calculi and 9 had a solitary stone (Table 6).

In control group, 17 patients experienced nausea or vomiting while as only 6 patients in levosulpiride group complained of same. None of the patients in levosulpiride group had nausea or vomiting within first 4 h (Table 7).

In control group, 16 patients were given rescue antiemetic whereas in levosulpiride group only 7 were given antiemetic (Table 8).

DISCUSSION

PONV following laparoscopic cholecystectomy is of multifactorial origin. The incidence of PONV, despite the advances in antiemetic therapy in the past decades is still found to be relatively high.

Factors affecting PONV include patient-related factors such as age, sex, phase of the menstrual cycle, anesthesia-
related factors such as use of volatile anesthetic agents, N2O, opioids and surgery-related factors (Bonder, 1991). Female gender has been associated with higher incidence of PONV compared to male patients. On an average, female patients suffer three times more often from PONV than men.

Our study was aimed at evaluating the antiemetic efficacy of levosulpiride in preventing PONV in patients undergoing laparoscopic cholecystectomy. Laparoscopic surgery was chosen because of high incidence of PONV associated with it. Naguib et al. demonstrated that the incidence of PONV after laparoscopic surgeries in their placebo group was remarkably high (72%) which is consistent with the findings of our study where the incidence of PONV in control group was about 57%. PONV is also one of most common reasons for patient’s poor satisfaction during post-operative period.

Despite advances in antiemetic therapy in the last decade, incidence of PONV is still found to be relatively high.

A wide variety of antiemetic drugs (e.g., anticholinergics, antihistaminics, dopamine receptor antagonists, glucocorticosteroids, neurokinin-1 antagonists, etc.) are available to prevent post-operative emetic symptoms. Although phenothiazines, butyrophenones (droperidol), and metoclopramide are also antiemetic, they are associated with extrapyramidal side effects (Islam, 2004).

In our study, the males outnumbered the females in both the control and levosulpiride group. The mean age in of control group was 37.93 ± 8.73 years (range 20-50 years) and that in levosulpiride group it was from 39.03 ± 7.55 years (range 21-50 years). The mean weight of the control group was 58.27 ± 8.14, whereas that of the levosulpiride group was 59.67 ± 6.91. A number of factors including sex, obesity and surgical procedure affect the incidence of emetic symptoms (Watcha 1992).

The majority of patients studied, presented with pain in the RHC followed by flatulent dyspepsia.

Preoperatively, ultrasound was done in all cases, showing multiple calculi predominantly followed by solitary stone.

Injection levosulpiride was administered 5 min before the induction of anaesthesia. Postoperatively, patients were
observed for 24 h. Metoclopramide 10 mg was given as a rescue antiemetic (based on the study conducted by Watcha who found and then suggested that administering a repeat dose of same antiemetic failed to control emetic symptoms). During first 24 h after surgery, all episodes of nausea and vomiting and complete response at various time intervals, i.e., 0-4, 4-12, 12-24 h, were analyzed statistically.

The study followed a well-established and robust methodology (Apfel, 2002). The incidence of PONV seen in the control group was observed to be highly consistent with that seen in many other recent studies, suggesting good comparability of these data with the latest literature (Kovac et al. 2008).

In the control group, the incidence of PONV was 56.67% within 0-4 h, 53.33% from 4 to 8 h, 56.67% from 8 to 12 h and 46.67% from 12 to 24 h, compared to the levosulpiride group, in which the incidence of PONV was 0.00%, 3.33%, 20.00% and 16.67% within the corresponding time intervals. This reflected the efficacy of pre-operative use of levosulpiride in consideration of studies by Pueyo et al. (1995) and Fuji et al.

Statistically significant improvement was also seen in terms of usage of the rescue anti-emetic, wherein 7 out of 30 patients were administered a rescue antiemetic in levosulpiride group, in control group the need for rescue antiemetic was more, with 16 patients being administered the same, showing a 30% lesser usage in the levosulpiride group. Furthermore, a lesser duration of hospital stay was seen in the levosulpiride group.

The incidence and profile of treatment-emergent adverse events were similar across both the study groups, i.e., control as well as the levosulpiride group, and there was no evidence of any of the toxicities of concern commonly associated with levosulpiride, such as extrapyramidal signs and symptoms, cardiotoxicity and psychological disturbances (Rossi, 1995).

In a study of over 200 patients Kranke et al. showed that administration of amisulpride preoperatively reduced the incidence of PONV in adult surgical patients. The observations made were consistent with the reduced rates of PONV seen with the usage of the drug levosulpiride in present study, wherein the incidence of PONV in control group was 17/30 (56.66%) and in the levosulpiride group was 7/30 (23.33%).

Singh (2015) in a series of 113 patients divided into three groups (Group 1 levosulpiride 40 patients, Group 2 domperidone 35 patients, and Group 3 metoclopramide 38 patients) found a highly significant improvement in symptoms scale in Group 1 levosulpiride 40 patients’ group, overall dyspeptic symptom relief rates were significantly high in the levosulpiride group ($P < 0.004$) as compared to domperidone and metoclopramide groups. Similarly in our study, a decreased incidence of nausea and vomiting was seen in the levosulpiride group ($P < 0.001$).

Apfel et al. (2004) in a large series of >5000 patients demonstrated that the benefit of a range of antiemetic interventions, including ondansetron, dexamethasone, and droperidol, was similar, with a relative risk reduction of ~25% compared with the absence of that intervention, equating to an absolute reduction of 15-20% points on a typical baseline PONV rate in the range 65-75%. This magnitude of benefit has been seen with many antiemetics in separate, placebo-controlled trials, including ondansetron (Fortney et al.) and palonosetron (Kovac et al., 2008). A cochrane collaboration meta-analysis of 737 studies involving 103, 237 patients found that eight agents tested were effective antiemetics, with relative risk reductions in the range 20-40% Carlisle et al. The benefit seen with injection levosulpiride 25 mg is a risk reduction of about 30%-points in absolute terms, which is promising.

The efficacy shown by levosulpiride appeared not to be at the expense of any toxicity. Of note, no extrapyramidal side effects were seen. Risk of cardiotoxicity too appears to be much lower. Levosulpiride has several attractive features for use in patients undergoing laparoscopic cholecystectomy. As it has a low propensity for drug interactions (Spina, 2007), it can be safely used in elder patients and in patients with renal failure.

This study demonstrates a significant benefit of preoperative administration of injection levosulpiride 25 mg in the prevention of PONV. All efficacy measures the incidence of PONV, requirement of rescue anti-emetic and duration of hospital stay, were reduced by a significant magnitude.

It is therefore concluded that the usage of injection levosulpiride 25 mg in patients undergoing laparoscopic cholecystectomy prevents PONV which thus improves quality of life postoperatively.

**CONCLUSIONS**

The pre-operative administration of injection levosulpiride 25 mg in patients undergoing elective laparoscopic cholecystectomy surgeries under general anesthesia significantly reduces the incidence of PONV. It was hence seen to improve the quality of life in early stage of post-operative rehabilitation and also decreases the duration of hospital stay.
REFERENCES


33. Naylor RJ, Inall FC. The physiology and pharmacology of postoperative nausea and vomiting. Anaesthesia 1994;49 Suppl:2-S.


Source of Support: Nil, Conflict of Interest: None declared.
Experience on Awareness, Acceptability, Safety, Efficacy, Complications and Expulsion of Post-partum Intrauterine Contraceptive Device Insertion

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Abstract

Background: Purpose: This study was conducted to evaluate the awareness, acceptance, safety, efficacy, complications and expulsion rate of Post-partum Intrauterine Contraceptive Device (PPIUCD) insertion among pregnant women in a tertiary care center.

Materials and Methods: This is a retrospective analytical study conducted in S.C.B Medical College and Hospital, Cuttack, Odisha, over a period of 4 years. Willing 6104 clients were inserted PPIUCD who delivered either vaginally or by cesarean section. Post insertion follows up done. Various relevant parameters are critically analyzed.

Results: Awareness about PPIUCD was significantly low compared to interval IUCD (11.37% vs. 69.53%). Acceptance rate was low (25.32%). Acceptance was higher in the age group of 26-30 years (35.3%), para-2 (42.84%) and those undergoing cesarean section (69%). 32.2% of acceptors came for follow-up. The main complaints at follow-up were missing thread and bleeding. Expulsion rate was low (2.91%). Continuation rate was 85.3%. No case of perforation, failure or any other major complication reported. The main causes of removal were bleeding and pressure from family.

Conclusion: This study indicates that PPIUCD as a postpartum family planning method was highly effective, demonstrably safe, having no serious complication reported after insertion or during follow-up and had lower rate of expulsion in spite of low acceptance. The method may be particularly beneficial in our setting where women do not come for postnatal contraception counseling and usage. The acceptance of PPIUCD can be increased with repeated counseling beginning at the early antenatal period, public awareness, and offering incentives to acceptor, motivator and course provider.

Key words: Acceptance, Contraception, Counseling, Intracesarean insertion, Post-placental intrauterine device

INTRODUCTION

India’s population of over 1.2 billion is slated to overtake China as the world’s most populous country, in <1 and half decade. Family planning could bring more benefits to more people at less cost than any other single technology now available to the human race (UNICEF). Family planning can avert nearly one-third of maternal death and 10% of childhood mortality if couples space their pregnancies more than 2 years apart.¹ India was the world’s first nation to adopt an official population policy and launched Family Planning Programme in 1951. Even though India has made considerable progress in reducing maternal mortality ratio, it still contributes 20% of maternal deaths worldwide (World Bank, UNFPA and WHO, 2012). Recommended spacing between the births to next pregnancy is at least 24 months and between abortions to next pregnancy should be at least 6 months (WHO Technical Committee, 2006). National Family Health Survey reported that 61% of birth were spaced <3 years and 22% of married women had an unmet need for family planning. There is 168 million eligible couple in India, of which only 44% practicing effective contraception. Better family planning and birth spacing services resulted in better maternal and neonatal outcome (WHO-2006).
Unmet need of family planning is 20.5%. 7.2% unmet need for spacing and 13.3% unmet need for limiting. (DLHS 3, 2007-2008). The unmet need for the contraception in the extended postpartum period (0-1 year) is high, i.e., around 65%, but only 26% of women are using any method of family planning during the 1st year postpartum period. If this unmet need is full filled over next 5 years, maternal mortality can be reduced to above 29%. After 3 months of childbirth, exclusive breastfeeding decreases while sexual activity increases and menstruation returns and hence the chance of pregnancy increases.

Immediate postpartum period is an ideal time to educate and counsel women on exclusive breastfeeding, future fertility, birth spacing or limiting intentions and provision of appropriate family planning methods in view of the high rate of unintended pregnancy. Apart from lactational amenorrhea, postpartum family planning (PPFP) methods available are barrier methods, progesterone only preparations, sterilization, and intrauterine device (IUCD). IUCD is convenient, hormone free, very safe, highly effective, reversible, coitus-independent, user-friendly due to the onetime application and long lasting method of contraception with high continuation rate. Advantage of immediate postpartum IUCD insertion includes high motivation, assurance that woman is not pregnant and convenient for women and service provider. Post-partum Intrauterine Contraceptive Device (PPIUCD) can serve both for spacing and limiting. Immediate PPIUCD during cesarean section provides adequate protection against pregnancy.

Increase in facility-based births offers convenient opportunities to provide women with this long-acting reversible method of contraception before they live the hospital in a setting where women do not come for postnatal contraception counseling and usage. Government of India has introduced the PPIUCD (Cu-T380A) insertion free of cost during the year 2011-2012, which provides effective protection for 10 years with a very low failure rate of (<0.5 HWY).

**MATERIALS AND METHODS**

This is a prospective analytical study conducted in the Department of Obstetrics and Gynecology, S.C.B. Medical College and Hospital, Cuttack, Odisha, India. It was conducted from January 2013 to January 2017. The study included 6104 pregnant women who were admitted and delivered vaginally or by cesarean section and inserted with PPIUCD (Cu-T380A). Types of insertion were post-placental, immediate postpartum and intracesarean who full filled the WHO medical eligibility criteria after taking informed consent. At the time of discharge, clients were advised to come for checkup at 6 weeks also counseled to report earlier for any side effects and complications such as foul smelling vaginal discharge, excessive vaginal bleeding, lower abdominal pain and discomfort, fever, any partial, or complete expulsion of the device. At 6 weeks of follow-up women were examined, any complaints are noted and treated. If the Cu-T is in place and she had no problem no further follow-up visits are required.

Various data in relation to demographic factors such as age, parity, socioeconomic status, and awareness to PPIUCD are analyzed among 6104 clients; so also the acceptance rate, insertion rate, timing and mode of insertion, follow-up of clients, safety, efficacy, side effects and complications, reason for removal of the device were analyzed.

**RESULTS**

During the study period total, no of PPIUCD acceptance was 6104 out of 24107 counseled patients with an acceptance rate of 25.32%. It is observed that acceptance rate had not significantly improved over a period of time. During counseling for PPFP method it is observed that majority of women were aware of Copper-T (interval IUCD), but few had ever heard its insertion in postpartum period (PPIUCD), (69.53% vs. 11.37%). (Tables 1 and 2).

Majority of PPIUCD acceptors were in the age group of 26-30 years (35.30%). Maximum acceptance was observed among para-2 (42.84%) (Tables 3 and 4).

60% of the acceptors belong to middle socioeconomic status (Table 5).

Insertion rate of PPIUCD has gone up over time though not significantly, and in the year 2016, 21.02% of total

**Table 1: Acceptance rate (year wise)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total counseled</th>
<th>Accepted</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>5108</td>
<td>780</td>
<td>15.27</td>
</tr>
<tr>
<td>2014</td>
<td>5724</td>
<td>1556</td>
<td>27.18</td>
</tr>
<tr>
<td>2015</td>
<td>5827</td>
<td>1588</td>
<td>27.25</td>
</tr>
<tr>
<td>2016</td>
<td>7448</td>
<td>2180</td>
<td>29.26</td>
</tr>
</tbody>
</table>

| Table 2: Awareness about IUCD vs. PPIUCD (n=24107 client, counseled) |
|--------------------------|------------------|----------------|
| Awareness               | Interval IUCD    | PPIUCD         |
| Yes                     | 16761 (69.53)    | 2741 (11.37)   |
| No                      | 7346 (30.47)     | 21366 (88.63)  |

PPIUCD: Post-partum intrauterine contraceptive device
In our study, the total acceptance for PPIUCD was 6104 out of 24107 number of women counseled with acceptance rate of 25.32%, whereas 18.8% acceptance rate was observed by Geeta and Juhi. from Bhopal and acceptance rate of 36.66% was observed by Runjun and Bornali in their 2 years study in a rural medical college in Assam.6 In this study, the acceptance rate was not significantly improved over the period of time, which has to be readdressed. Highest rate of acceptance was among the age group of 26-30 years (35.3%). Alvarez Pelayo and Borbolla Sala (1994) also found the average age of PPIUCD acceptors was 20.6%, whereas in a study conducted by Malchuru et al. from Guntur the highest rate of acceptance was among the age group of 30-39 years (27.67%).8 A study conducted by Kathite and Agarwal and Mishra revealed the highest rate of acceptance was among the age group of 21-25 years.6,7 According to the director of family welfare, Tamil Nadu, India in the year 2011-12, 59% of the acceptors were in the age group of 20-24 years, 31% were in the age group of 25-29 years, 6% in the age group of 34-44 years, and only 4% were in the age group of 15-19 years.

In our study, maximum acceptors were para-2 (42.84%). Bhalerao and Purandare had 46.5% of the women para-1, 46% were para-2, and 69% had accepted IUDS because they had at least one living male child.12 Whereas Malchuru et al., Mishra, Goutam et al. and Vidyarama et al. found an acceptance rate of 15.42%, 13.76%, 71.91%, and 15.47%, respectively, in primipara.9,11,13,14 As per the study conducted by DFW, Tamil Nadu 2011-2012 most (72%) of the acceptors were primipara, 25% were para-2, and only 3% had a higher order of birth. Our finding is similar to that of the study by Grimes et al., where they found most of the PPIUCD acceptors were multiparous clients (65.1%).

### DISCUSSION

In our study, the main reason for removal of PPIUCD was due to bleeding problem (39.33%, [94/239]) and due to family pressure (35.14%, [84/239]).

Of the 2027 followed up patients, 564 had complications with a complication rate of 27.82%. It was observed that 246 clients (12.13%) had irregular bleeding, 103 (5.08%) had abdominal pain, 98 (4.83%) had missed thread, 58 (2.86%) had infection, and 59 (2.91%) had expulsion (Table 9). Neither any major complications nor any failure was noticed during the 4 years study period.

The higher rate of expulsion (2.12%) was seen between 7 days and 6 weeks of PPIUCD insertion and was lowest after 6 weeks of insertion (0.79%). Most of the complaints were dealt with assurance, antibiotics for infection, and nonsteroidal anti-inflammatory drug for pain. No one needed hospitalization. To locate the device ultrasonography was done in clients having missing strings. Out of 6104 insertion, 2027 clients came for follow-up. 59 had expulsion and 239 had removal leads to a continuation rate of 85.3%. Clients who had expulsion of the device were counseled for an alternative method of modern contraception including interval IUCD.

### Table 3: PPIUCD acceptors in different age group (year wise)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Acceptors year 2013</th>
<th>Acceptors year 2014</th>
<th>Acceptors year 2015</th>
<th>Acceptors year 2016</th>
<th>Total acceptors</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>233</td>
<td>401</td>
<td>305</td>
<td>318</td>
<td>1257</td>
<td>20.60</td>
</tr>
<tr>
<td>26-30</td>
<td>303</td>
<td>602</td>
<td>578</td>
<td>670</td>
<td>2153</td>
<td>35.30</td>
</tr>
<tr>
<td>31-35</td>
<td>169</td>
<td>355</td>
<td>501</td>
<td>551</td>
<td>1576</td>
<td>25.80</td>
</tr>
<tr>
<td>36-40</td>
<td>75</td>
<td>198</td>
<td>204</td>
<td>641</td>
<td>1118</td>
<td>18.30</td>
</tr>
<tr>
<td>Total</td>
<td>780</td>
<td>1556</td>
<td>1588</td>
<td>2180</td>
<td>6104</td>
<td>100</td>
</tr>
</tbody>
</table>

PPIUCD: Post-partum intrauterine contraceptive device

### Table 4: Acceptance of PPIUCD according to parity

<table>
<thead>
<tr>
<th>Year</th>
<th>Total insertion</th>
<th>Primipara (%)</th>
<th>Para-2 (%)</th>
<th>Multipara (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>780</td>
<td>257 (32.95)</td>
<td>358 (45.90)</td>
<td>165 (21.15)</td>
</tr>
<tr>
<td>2014</td>
<td>1556</td>
<td>529 (34.00)</td>
<td>652 (41.90)</td>
<td>375 (24.10)</td>
</tr>
<tr>
<td>2015</td>
<td>1588</td>
<td>576 (36.27)</td>
<td>668 (42.07)</td>
<td>344 (21.66)</td>
</tr>
<tr>
<td>2016</td>
<td>2180</td>
<td>835 (38.30)</td>
<td>937 (42.98)</td>
<td>408 (18.72)</td>
</tr>
<tr>
<td>Total</td>
<td>6104</td>
<td>2197 (36.00)</td>
<td>2615 (42.84)</td>
<td>1292 (21.16)</td>
</tr>
</tbody>
</table>

PPIUCD: Post-partum intrauterine contraceptive device

In this study, acceptors of PPIUCD were more among cases requiring cesarean section (69%) followed by post-placental insertion (19.95%) (Table 7).
Table 5: Socio economic status among acceptors (year wise)

<table>
<thead>
<tr>
<th>S-E status</th>
<th>Number of acceptors year 2013 %</th>
<th>Number of acceptors year 2014 %</th>
<th>Number of acceptors year 2015 %</th>
<th>Number of acceptors year 2016 %</th>
<th>Total acceptors year 2013-2016 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>193 (24.74)</td>
<td>379 (24.36)</td>
<td>428 (27.00)</td>
<td>502 (23.00)</td>
<td>1502 (24.60)</td>
</tr>
<tr>
<td>Middle</td>
<td>472 (60.52)</td>
<td>902 (57.97)</td>
<td>1001 (63.00)</td>
<td>1287 (59.00)</td>
<td>3662 (60.00)</td>
</tr>
<tr>
<td>High</td>
<td>115 (14.74)</td>
<td>275 (17.67)</td>
<td>159 (10.00)</td>
<td>391 (18.00)</td>
<td>940 (15.40)</td>
</tr>
<tr>
<td>Total</td>
<td>780</td>
<td>1556</td>
<td>1588</td>
<td>2180</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Timing of PPIUCD insertion

<table>
<thead>
<tr>
<th>Year (2013-2016)</th>
<th>Post placental (%)</th>
<th>Post-partum (%)</th>
<th>Intra caesarean (%)</th>
<th>Total insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>166 (21.28)</td>
<td>40 (5.13)</td>
<td>574 (73.59)</td>
<td>780</td>
</tr>
<tr>
<td>2014</td>
<td>205 (13.18)</td>
<td>65 (4.18)</td>
<td>1286 (82.64)</td>
<td>1556</td>
</tr>
<tr>
<td>2015</td>
<td>465 (29.28)</td>
<td>265 (16.68)</td>
<td>858 (54.04)</td>
<td>1588</td>
</tr>
<tr>
<td>2016</td>
<td>382 (17.52)</td>
<td>303 (13.90)</td>
<td>1495 (68.58)</td>
<td>2180</td>
</tr>
<tr>
<td>Total</td>
<td>1218</td>
<td>673</td>
<td>4213</td>
<td>6104</td>
</tr>
</tbody>
</table>

During the study, it was found that only 11.37% of the clients were familiar with PPIUCD. A study conducted by Geeta and Juhi (2013) revealed that only 5.79% were familiar with PPIUCD and 94.21% women have not even heard of PPIUCD which emphasizes poor awareness regarding insertion of IUCD immediately after delivery though PPIUCD has many advantages over interval IUCD.6 60% of the acceptors in our study belong to middle socioeconomic status. As IUCDs are supplied free of cost by Government of India, socioeconomic status does not play any key role so far as the PPIUCD insertion is concerned. In this study, the insertion rate of PPIUCD has gone up though not significantly over a period of time and in the year 2016, 21.02% of the total delivery cases accepted PPIUCD as PPFP method. In our study acceptance of PPIUCD was more among the cases requiring cesarean section (69%). A study was conducted by Runjun and Bornali (2016) the acceptance of PPIUCD among lower segment cesarean section patients and vaginally delivered patients were 77.07% and 22.93%, respectively. According to study conducted by Shobhasmita et al. (2011-2014) intracesarean insertion was 83.73% .15 This indicates high motivation among women who are going to deliver by LSCS, because of future uterine scar rupture if they become pregnant early and of course they do not want higher order of birth. Somesh et al. in their study reported one-third of insertion during cesarean section.6

Out of 2027 clients who turned for follow-up in our study in a urban tertiary care hospital. In this study, expulsion rate was 2.91% which is low as compared to a study conducted in Zambia (5.6%). Mishra and Shobhasmita et al reported expulsion rate of 6.4% and 6% respectively.11,18 The result of our study is comparable with a study done in the year 2011-2012 in 16 health facilities in eight states and territory Delhi where they have reported 3.6% of expulsion rate. Geeta and Juhi, Bhalerao & Purandare and Tatum et al reported gross cumulative expulsion rate of 10.5%, 16.4% and 16.2% respectively. 6,12,18 Lower rate of expulsion (1.6%) was found among 3000 acceptors of PPIUCD in a hospital in Paraguay. According to Chi et al., insertion during cesarean section has lower expulsion rate than during postpartum.19

In our 4 years study period in a tertiary care hospital in Odisha <50% (2027 out of 6104; i.e., 33.20%) of clients turned for follow-up at 6 weeks of insertion, and the follow-up rate did not increase over the period of time. whereas the study conducted by Geeta and Juhi in Bhopal, Mishra in a District Head Quarter Hospital, Bolangir and Manju et al in North India observed follow-up rate of 83.41%, 59.98% and 78.62% respectively.6,11,20 The reason behind lesser no of women turned for follow to our institution could be that many of the clients might have attended the local hospitals.
In our study most common reason for removal of Cu-T was bleeding problem (39.33%), which is similar to reporting done by Runjun and Bornali (42.11%) and Mishra (32.56%). whereas Malchuru et al reported 27.27% of the removal was due to the bleeding problem. Our study reveals that 35.14% of removal of PPIUCD was due to family pressure. Mishra has reported that 23.26% of removal of PPIUCD was due to family pressure, whereas Runjun and Bornali reported 17.54% and Malchuru et al. reported 27.27% of removal were due to family pressure. Goswami et al. highlighted family pressure as the significant reason for IUCD removal.

In our study not a single case of pregnancy had occurred out of 2027 followed up clients. Whereas one case of intrauterine pregnancy occurred out of 939 followed up patient and out of 52 followed up patients in the study conducted by Runjun & Bornali and Kanhere et al respectively.

Our study reported missing thread of 4.83% among 2027 followed up clients which are lower than study conducted by by Mishra and Manju et al where they have reported 8.69% and 11.2% respectively.

In our study, request for removal was 17.61% which is higher as compared to other studies (7.5% by Shobhasmita et al., 3% by Blumenthal et al. among women in Zambia, and 7.6% by Kittur et al. in Hubli, Karnataka). This speaks of the importance of reassurance and counseling to achieve higher continuation rate.

In our study among 6104 no of acceptors over a period of 4 years from January 2013 to January 2016 with follow-up rate of 33.20% concludes with acceptance rate 25.32%, declined 74.68%, complication 27.82%, and continuation in 85.29%.

**CONCLUSION**

To conclude our study, we found good retention and continuation rate among the users with average acceptance rate. At present overall acceptance rate is low and need to be improved. There was no major complication. Minor side effects need reassuring. The acceptance was higher in patients undergoing cesarean section which has its own vivid advantage in terms of birth spacing, regaining parturient's health. Major problem we faced is strong myths and misconceptions regarding IUCD as a method of contraception. The myths/misconception regarding IUCDs were infection, perforation, migration, infertility, and bleeding problem as revealed by the PPIUCD acceptors. Our study show high retention rate as comparable with other study because of proper fundal placement of Cu-T at the time of insertion by the trained service provider, adhering to strict asepsis, no touch technique and strictly following WHO medical eligibility criteria before inserting PPIUCD which also led to minimal side effects and complication. Early and repeated counseling during each antenatal visit and at the time of admission to labor room is highly required along with some incentive to both client and service provider and public awareness through different media sources to increase not only acceptance but also continuation rate in a situation of limited access to postpartum care.

Inserting Cu-T-380 A within 10 minutes after placental delivery and during cesarean section is one time, long term, coitus-independent, reversible demonstrably safe, effective method of contraception having low expulsion rate and has no effect on breast milk. So awareness has to be created regarding PPIUCD among pregnant women particularly during antenatal checkup. To increase the levels of awareness, the government needs to develop strategies to increase public awareness for the PPIUCD as a safe and effective method of contraception through different media sources. It is also important to arrange for training on PPIUCD to increase knowledge and skills among healthcare providers. Cash incentives to the accepter, motivator and of course provider would bring about a substantial progress in the PPIUCD use in developing countries like India where women do not come for postnatal contraception counseling and usage.

**ACKNOWLEDGMENT**

Authors sincere thank all the doctors, nurses, counselor, staffs of S.C.B Medical College and Hospital, Cuttack, India, for their active participation in implementation of this National Program. We are also very much thankful to all our clients for their overwhelming cooperation.

**REFERENCES**


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**Table 9: Complications**

<table>
<thead>
<tr>
<th>Pain (%)</th>
<th>Bleeding (%)</th>
<th>Missing threads (%)</th>
<th>Expulsion</th>
<th>Infection</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>103/2027 (5.08)</td>
<td>246/2027 (12.13)</td>
<td>98/2027 (4.83)</td>
<td>59/2027 (2.91)</td>
<td>58/2027 (2.86)</td>
<td>564/2027</td>
</tr>
</tbody>
</table>


Source of Support: Nil, Conflict of Interest: None declared.
Variation in Branching Pattern of Brachial Artery

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Abstract

Introduction: The brachial artery (BA) provides main arterial supply to the arm. It begins as the continuation of 3rd part of the axillary artery, at the level of inferior border of teres major muscle. It ends at the level of the neck of radius by dividing into radial arteries (RAs) and ulnar arteries (UAs). We tried to find variation in the branching pattern of BA of the artery.

Aim: The aim of this study is to discuss variations in branching pattern of BA and also their embryological and clinical significances.

Methods: This study was conducted on 40 upper limbs from the Department of Anatomy, Government Medical College and Hospital, Chandigarh.

Results: In this study, we observed higher division of BA into RA and UA above the elbow joint in 4 cases. UA was seen trifurcated at the lower border of pronator teres in cubital fossa in 3 cases. Superior ulnar collateral artery arose from UA in 2 cases, and inferior ulnar collateral artery was absent in 4 cases.

Conclusions: The knowledge of variation in origin and course of BA is useful for orthopedicians, physicians, radiologist, vascular, and plastic surgeons. Variation in branching pattern of arteries of the upper limb has diagnostic and interventional significance.

Key words: Brachial artery, Higher division, Median nerve, Radial artery, Ulnar artery

INTRODUCTION

Brachial artery (BA) is the main artery of the arm. It begins at the lower border of teres; major muscle as a continuation of the axillary artery and terminates by dividing into radial artery (RA) and ulnar artery (UA) at the level of the neck of radius in cubital fossa (CF). The BA is wholly superficial, covered anteriorly only by skin, and superficial and deep fasciae. The bicipital aponeurosis crosses it anteriorly at the elbow, separating it from the median cubital vein at its lower part. The median nerve (MN) crosses it from lateral to medial side near the distal attachment of coracobrachialis. BA is posteriorly related to the long head of triceps, separated by the radial nerve and profunda BA (PBA), and then successively by the medial head of triceps, the attachment of coracobrachialis and brachialis. Proximally, the MN and coracobrachialis lie laterally while distally the biceps and muscles overlap the artery. Proximally, the medial cutaneous nerve of the forearm and ulnar nerve lie medially, while distally the MN and basilic vein lie medially. Two venae comitantes running with the BA, connected by transverse and oblique branches. Branches of BA are PBA, superior ulnar collateral artery (SUCA), middle and inferior ulnar collateral artery, muscular branches, nutrient branch, and two terminal branches are RA and UA. Variations in the pattern of upper limb arteries have been reported since the 17th century. Quain’s in 1844 published the first systematic description and classification of these variations on the basis of cadaver dissection and angiographic studies. Variations in upper limb arteries are fairly common. The most commonly reported variation is the higher division (HD) of BA into RA and UA above the CF. According to the compendium of human anatomic variation, major variations are present in about 25% of the subjects studied for the BA. The variations in the form of high proximal division into terminal branches occur in the RA (15%), UA (2%), and common interosseous artery.

Various authors have mentioned about the incidence of high origin of RA. This HD may occur at any point in the
normal course of the vessel but it is more common in the middle third. The two vessels run parallel to each other to the bend of the elbow, in the usual position of the BA. From this point, one branch follows the normal course of the RA through the forearm, and the other one takes the normal course of the UA. This arrangement is considered a simple HD of the BA. In this study, we focused on the anatomical topography of the BA branching pattern variation and discussed its morphological and clinical significance.

MATERIALS AND METHODS

This study was conducted on 40 upper limbs (17 left and 23 right) in Government Medical College and Hospital, Chandigarh. Dissection was done as per the guidelines. Structures were identified, cleaned, and photographed. After dissection of BAs, following observations are noted:

1. Length of BA.
2. Branches of BA. Site of origin of all branches was noted and the distance between proximal point of main trunk and origin of branch was measured.
3. Relations of BA with MN in arm.
4. Relations of BA with neighboring structures in CF we studied.

Aim
The aim of the present study is to discuss variations in branching pattern of BA and also their embryological and clinical significances. These variations were compared cases in available literature of such variations.

RESULTS

In this study, we found higher bifurcation of BA in 4 cases (3 left and 1 right upper limbs; 10%), out of 40 upper limbs. In case 1 (left upper limb), we detected that BA divided into UA and RA about 8 cm above the elbow joint (Figure 1a). Total length of BA was 3 cm. The MN was lying medial to the BA in the upper part of arm. At the level of bifurcation of BA, MN crossed artery anteriorly from medial to lateral side of artery. After the division of the artery, the nerve was present first behind the RA and then between the RA and UA. Later in the lower part of arm, it remained on medial side of RA (Figure 1c). In lower part of arm, UA was medial to the MN. In the CF, contents are MN, biceps brachii (BB) tendon, RA, and radial nerve from medial to lateral side. PBA originated from BA about 2 cm above the bifurcation of the BA. It originated in the form of two small branches and then coursed through the spiral groove in posterior compartment of arm. SUCA arose from UA about 6.5 cm above the elbow joint (Figure 1b). Inferior ulnar collateral artery was absent. In the lower part of arm, muscular branches also originated from UA. RA traveled on lateral side and was running on anterior surface of BB muscle in lower part of arm. RA entered into forearm by passing medial to the brachioradialis. In the forearm, the RA ran superficially as written in standard textbooks of anatomy. The UA passed deep-to-deep head of pronator teres in forearm. In CF, UA trifurcated at the lower border of pronator teres. The two branches were muscular and common interosseous artery. The third branch was the continuation of UA itself. Common interosseous artery divided into anterior and posterior interosseous artery (Figure 1d).

In case 2 (left upper limb), we observed that BA terminated into RA and UA in the left upper limb about 20 cm above the elbow joint. Total length of BA was 4 cm. In the upper part of arm, the MN was lying lateral to the BA. After the division of the artery, the nerve was present first behind the RA and then between the RA (laterally) and UA (medially). Here, relations of MN with UA and RA are same as in case 1. Later in the lower part of arm, it remained on medial side of RA. In lower part of arm, UA was medial to the MN (Figure 2a). In the CF, contents are UA, MN, BB tendon, RA, and radial nerve from medial to lateral side. PBA originated from BA about 2 cm above the bifurcation of the BA (Figure 2a). It originated in the form of two small branches and then coursed through the spiral groove in posterior compartment of arm same as
in case 1. SUCA arose from UA about 18 cm above the elbow joint. Inferior ulnar collateral artery was absent as in case 1. Muscular branches in the lower part of arm also originated from UA. In lower part of arm, RA traveled on lateral side and was running on anterior surface of BB muscle. In the forearm, the course of RA was normal. The UA passed deep-to-deep head of pronator teres in forearm. In CF, UA divided into three branches at the lower border of pronator teres. The two branches were median and common interosseous artery. The third branch was the continuation of UA itself. Common interosseous artery divided into anterior interosseous and posterior interosseous artery (Figure 2b).

In case 3 (right upper limb) and 4 (left upper limb), we found bifurcation of BA into RAs and UAs about 7.5 cm (case 3) and 7 cm (case 4), respectively, above the elbow joint. Both the arteries had superficial course in the arm along the medial aspect of BB. PBA originated as a single branch about 3 cm above the bifurcation of BA in both cases. SUCA (8.5 cm in case 3 and 8 cm in case 4, above elbow joint) and muscular branches arose from BA in both cases. In the lower part of arm, RA was seen crossing the MN anteriorly from medial to the lateral side. After this, MN lying between RA and UA. In the CF, UA seen deep to the pronator teres separating it from MN. Further course of RA and UA was normal. The contents of CF from medial to lateral side were UA, MN, RA, and radial nerve in both cases.

**DISCUSSION**

Developmental Basis of Variation

The axis artery of the upper limb is derived from the seventh cervical intersegmental or subclavian artery. This artery grows distally along the ventral axial line and terminates in a palmar capillary plexus in the hand. Axillary artery, BA, anterior interosseous artery, and deep palmar arch develop from the main trunk of axis artery. RAs and UAs develop later as sprouts of the axis artery close to bend of the elbow. Initially, the RA arises more proximally than the UA. Later, it establishes a new connection with the main trunk at or near the level of origin of the UA. Usually, the upper portion of the original stem disappears so that the RAs and UAs arise at the same level. In this study, both the RAs and UAs originated more proximally from the BA leading to its termination into RAs and UAs in the middle of the arm. Persistence of the upper portion of RA arising from BA proximal to origin of UA and the failure of establishing the new connection of RA with BA at the level of origin of UA result in this type of variation. Various vascular variations of upper limb results from the persistence or elimination of parts of these arteries.

According to Arey, the anomalous blood vessels may be due to (i) the choice of unusual paths in the primitive vascular plexuses, (ii) the persistence of vessels normally obliterated, (iii) the disappearance of vessels normally retained, (iv) incomplete development, and (v) fusions and absorption of the parts usually distinct. Anomalies of the forelimb arterial tree are fairly common, probably because they have multiple and plexiform sources, display a temporal succession of emergence of principles arteries, anastomoses and periarticular networks, and some path that is initially functionally dominant subsequently regress. In general, anomalous pattern may present as differences in the mode and proximodistal level of branching; the presence of unusual compound of arterial segments; aberrant vessels that connect with other principal vessels, arcade, or plexuses; vessels that occupy exceptional tissue planes (e.g., superficial fascia instead of the usual subfacial route) or which have unexpected neural, mycological, or osteon ligamentous relationships. Early limb bud receives blood through intersegmental arteries, which contribute to a primitive capillary plexus. At the tip of the limb bud, there is a terminal plexus that is constantly renewed in a distal direction as the limb grows. Later, one main vessel supplies the limb and the terminal plexus; it is termed the axis artery. The aforesaid terminal plexus at the tip of the limb bud is separated from the outer ectodermal sleeve of the limb by an avascular zone of mesenchyme. This avascular region contains an extracellular matrix consisting largely of hyaluronic acid. Removal of this hyaluronic acid by hyaluronidase results in vascularization of the tissue since partial degradation products of hyaluronic acid are angiogenic. Thus, ectodermal-mesenchymal interactions and extracellular matrix components are controlling the initial patterning of blood vessels within the limb.

It is not uncommon to find variations in the branching pattern of arteries of the upper limb. Although the first reported arterial variation in the upper limb was by Von Haller in 1813, incidence of HD of BA is 25% in various populations of the world. The highest percentage of variations of BA is mainly form by high origin of RA and
High origin of RA occurrence is 3-15%, as reported by different authors.9-12 Satyanarayana et al. also described a case of early division of BA in middle of the right arm into RA and UA.19 A case of higher bifurcation of the BA (right side = 20 cm and left side = 21.5 cm) above the CF was described by Rossi et al.14 Singh et al. also observed that BA divided into RA and UA about (right side = 7.5 cm and left side = 10.5 cm) above the line joining humeral epicondyles.15 Similar findings were noted by Puspalatha16 and NM. Suresh et al.17 On the other hand, Gupta et al. reported about an unusually short segment BA with bifurcation proximal at the level of insertion of coracobrachialis in 2 out of 20 cadavers.18 Varlekar et al. also described HD of BA in 3 cases out of 48 cadavers.19 In this study, we also found HD of BA in 4 cases (1 right and 3 left upper limbs). In all 4 cases, we observed that BAs terminated (in case 1 = 8 cm, case 2 = 20 cm, case 3 = 7.5 cm, and case 4 = 7 cm) above the elbow joint (Figures 1a, 2a, 3, and 4).

**Figure 3: Higher bifurcation of BA and relations of the median nerve with BA, radial, and ulnar artery in arm on the right side. BA: Brachial artery, RA: Radial artery, UA: Ulnar artery, MN: Median nerve, MCV: Median cubital vein, BB: Biceps Brachii**

Icten et al. reported about a case in which RA arising from the axillary artery bilaterally in a cadaver.20 Similar findings were observed by Okaro and Jiburum.4 On the other side, a case of high origin of RA from 3rd part of axillary artery proximal to the two roots of the MN was noticed by Balehandra et al.19 In this study, we observed that RA and UA had high origin from BA in 4 cases (1 right and 3 left upper limbs). Teli et al. reported a case of HD of BA. In this case, BA before its termination gave out the posterior circumflex artery, PBA, and SUCA. The MN crossed RA from lateral to medial side as it traveled to CF.21 In this study, PBA originated in the form of two small branches (case 1 [Figure 1b], and case 2 [Figure 2a], left upper limbs) and as single branch (case 3, right side, and 4, left side) from BA before its termination, whereas SUCA arose from UA (case 1 = 6.5 cm [Figure 1b] and case 2 = 18 cm) and BA (case 3 = 8.5 cm and case 4 = 8 cm) above the elbow joint. The inferior ulnar collateral artery was absent in these 4 cases. We also noted that RA was seen crossing the MN anteriorly from medial to lateral side, in lower part of arm (Figures 3 and 4), and the rest of the course was same in the forearm (case 3 and 4). The RAs and UAs descended parallel to each other in the arm, over the BB muscle. On the other hand, MN lying medial to the BA in the upper part of arm and crossed artery anteriorly from medial to lateral side in case 1 (left upper limb [Figure 1c]). After the termination of the artery, the nerve was present first behind the RA and then between the RA and UA (case 1 [Figure 1b] and case 2 [Figure 2a]).

Gujar et al. studied 30 cadavers. In one case, the BA was divided into middle third of arm into RAs and UAs. The PBA arose from BA but the superior and inferior ulnar collateral branches arose from the UA. In other case, the RA arose from 3rd part of the axillary artery from ventral side in the axilla. The RA passed downward and cross MN from medial to lateral side and then pass along medial side of the BB muscle.22 Similar findings were noted in this study, but inferior ulnar collateral artery was absent in these cases. Relations of RA and MN was found same in cases 3 and 4 (Figure 3) as previously mentioned by Gujar.22

Vishal and Pretty reported about a case in which BA bifurcated into a radial and ulnar branch 9.5 cm distal to the lower border of teres major muscle. The ulnar branch trifurcated at the proximal border of pronator teres muscle. One branch continued as similar course as that of UA forming the superficial palmar arch. The other two branches were muscular and common interosseous artery.13 In this study, we found similar branching pattern of UA in case 1 (Figure 1d) and (Figure 2b), but in case 2 muscular branch was replaced by median artery but the difference is in relation of the vessel and MN (Figures 1c
and 2a). In case 1, the MN was lying medial to the BA in the upper part of arm. At the level of bifurcation of BA, MN crossed artery anteriorly from medial to lateral side of artery. After the division of the artery, the nerve was present first behind the RA and then between the RA and UA (Figure 1c). In case 2, MN lying lateral to BA. After the division of the artery, the nerve was present first behind the RA and then between the RA (laterally) and UA (medially) (Figure 2a).

The unusual division of BA can be explained on the basis of embryological development of vessels of upper limb mentioned above.

Clinical Importance
Knowledge of possible variations in the branching pattern of various arteries is important during vascular and reconstructive surgery. These variations are of great importance in cardiac catheterization for angioplasty and arterial grafting also. These variations of the BA may cause difficulties while measuring the blood pressure. Being superficial, the RA may be mistaken as a vein and the accidental injection of some drugs may cause reflex vascular occlusion, resulting in disastrous gangrene of hand. The superficial course of RA can easily be injured by trauma. Arterial thrombosis, producing ischemia after radial cannulation, may be related to high risk of tissue gangrene or amputation. Angiographic images and Doppler ultrasound imaging are of considerable importance during invasive and non-invasive investigative procedures due to this kind of variations. The surgeons should be aware of arterial variations in the region before embarking on the procedure.

CONCLUSION
The reported cases of variations revealed higher termination and bifurcation of BA more on the left side (3 cases) of cadavers. In this study, we observed that SUCA arose from UA in 2 cases and inferior ulnar collateral was absent in all 4 cases. This study must be quite interesting for the clinicians to be aware of the possible variations in the branching pattern of the arteries to avoid complications in surgical and diagnostic procedures.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Unusual Presentations of Hydatid Cyst - A Case Study

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Abstract

Introduction: Hydatid disease is commonly found in the endemic countries within sheep rearing population of the temperate zones such as Middle East, India, Africa, South America, New Zealand, and China. Apart from liver and lung which are most often affected organs, hydatid cysts in any other location are considered uncommon.

Materials and Methods: We report 4 cases of hydatid disease presenting with cysts at unusual locations, namely, anterior abdominal wall, gluteal region, interscapular region, and right kidney. 3 of the cases, we report in the subcutaneous tissue which is very rarely seen and one in the kidney.

Results: Cystic echinococcosis remains a health issue in developing countries because of the lack of strict control programs to prevent the transmission of this infection and problems such as high populations of stray dogs, illegal butchering of animals, and poor public education about the disease. The gluteal hydatid cyst posed a diagnostic dilemma with a gluteal abscess and similarly the interscapular hydatid cyst with a tubercular abscess as both these were unusual sites.

Conclusion: Occurrence of hydatid cysts in the gluteal region, anterior abdominal wall, and interscapular region has been reported very rarely in literature. Whenever a cystic lesion is encountered in any region of the body, the possibility of hydatid cyst should be borne in mind especially in the endemic areas.

Key words: Cystic echinococcosis, Hydatid cyst, Renal hydatid, Subcutaneous hydatid, Unusual hydatid

INTRODUCTION

Hydatid cyst disease is a zoonotic infection where the causative organism is *Echinococcus granulosus*. It is commonly found in the temperate zones of the world in endemic countries India, Africa, Middle East countries, South America, New Zealand, and China where sheep rearing is commonly practiced. Lack of access to clean potable water supplies and close association of people with domestic animals like sheep and dogs makes the disease endemic in India.1 The liver is the most frequently involved organ (75%), followed by the lung (10%).2 Primary hydatid cysts of the skeletal muscles and subcutaneous tissue are rarely encountered even in areas where echinococcal infestation is common, and some isolated case reports of such presentation have been reported.3 Apart from liver and lung which are most often affected organs, hydatid cysts in any other location are considered uncommon. In this paper, we present a series of 4 cases of hydatid cyst disease found in the anterior abdominal wall, gluteal region, interscapular region, and kidney.

MATERIALS AND METHODS

We report 4 cases of hydatid disease (Table 1) presenting with cysts at unusual locations, namely, anterior abdominal wall, gluteal region, interscapular region, and right kidney. 3 of the cases we report were in the subcutaneous tissue which is very rarely seen and one in the kidney.
RESULT

Case Studies

Case 1
A 62-year-old male patient presented to our hospital with a history of progressive increase in the size of a painless swelling over the abdomen which he had noticed one and a half month back (Figure 1). The patient had undergone laparotomy with a right paramedian incision 3 years back. There was no history of trauma and no history of reducibility of the swelling. Rest of the general physical examination was unremarkable. Ultrasonography revealed a cystic mass which was later confirmed by computed tomography (CT) findings which revealed a large extraperitoneal cystic mass with multiple daughter cysts in the extraperitoneal plane in the anterior abdominal wall. The cyst was herniating into the left inguinal region and reaching the left scrotal sac. On surgical exploration, there was a white cystic mass in the subcutaneous plane with macroscopic appearance of hydatid cyst (Figure 2). The sac was excised into and sent for HPR which revealed dense inflammatory infiltrate comprised predominantly of neutrophils, few lymphocytes, histiocytes in a necrotic background which was consistent with hydatid disease. The post-operative course was uneventful.

Case 2
A 45-year-old lady presented to our hospital with a swelling in the left gluteal region since 1 month. There was no history of any previous intramuscular injections. The patient had received over the counter drugs for the past 1 week; however, the swelling had not decreased in size. Her general physical examination was unremarkable. On local examination, a mildly tender solitary spherical swelling situated in the upper and outer quadrant of the left gluteal region measuring 5 cm in diameter, with a smooth surface and cystic consistency was noted. Skin over the swelling was normal. A soft tissue ultrasonography (USG) was performed which revealed a rounded cystic mass that was limited to the subcutaneous plane, superficial to gluteal muscles on the left side. The cystic mass contained fluid and showed no flow on Doppler. A provisional diagnosis of resolving gluteal abscess secondary to folliculitis or antibioma was made and patient posted for surgery. A cruciate incision was taken keeping in mind the possibility of a gluteal abscess (Figure 3).

However, on surgical exploration, there was a white cystic mass attached to the subcutaneous adipose tissue but free
from underlying muscles. The macroscopic appearance appeared to be that of a hydatid cyst. It contained nonpurulent thin serous fluid which was suctioned out. The cyst wall was excised into and sent for histopathology. The resultant cavity was washed with hypertonic saline and left open to heal by secondary intention. The post-operative period was uneventful, and the patient recovered well. The histopathological examination showed fibrosis, necrosis, mixed type of inflammatory cells, fibroblastic activity and vascular proliferations in adipose and connective tissues.

**Case 3**

A 36-year-old male patient presented to our surgical outpatient department with a slowly growing painless swelling over his back in the interscapular region for the past 4 months. Physical examination revealed a diffuse nontender swelling of size 8*6 cm. There was no history of trauma or weight loss, and the chest X-ray was normal. The patient had a history of contact with farm animals. The only significant hematological examination was raised eosinophil count. At operation, the cyst was found to be surrounded by a thick fibrous capsule and was not adherent to the underlying muscles. A total pericystectomy was done without any spillage. The cavity was closed keeping a suction drain. On microscopic examination, it showed three layers: Adventitia, laminated, and germinal layers. The germinal layers had multiple brooding capsules with many scoleces in it. The post-operative course was uneventful.

**Case 4**

A 75-year-old female patient presented to our hospital with pain and gradually increasing lump in the right flank for 6 months. The pain was mild, dull aching, and non-radiating. A nontender lump occupying the right lumbar region was palpable measuring about 10*8 cm with a smooth surface, firm consistency and moved cephalon-caudally with respiration. Rest of the abdomen and general physical examination was normal. The USG of the abdomen revealed a well-defined 7*6 cm cystic lesion occupying mid and lower region of right kidney, with multiple cysts of varying sizes inside and hyperechoic stroma. Other organs were normal. A subsequent CT scan confirmed the possibility of a renal hydatid cyst (Figure 4). The patient was operated with a right lumbar incision and extraperitoneal approach. A total cystectomy was performed leaving the pericyst in situ. No bleeding or urine leak was observed from the pericystic wall. The cavity was irrigated with scolicidal agent, and the cavity was closed keeping a drain.

**DISCUSSION**

Cystic echinococcosis remains an important health issue in developing countries because of the lack of strict control programs to prevent the transmission of this infection plagued by other problems such as high populations of stray dogs, illegal slaughtering of animals, and poor public education, and awareness about the disease. The liver (50-70%) followed by the lung (20-30%) continue to be the commonly affected organs encountered in surgical practice. Finding hydatid cyst in a striated muscle is rare, and this has been attributed to two factors - the presence of lactic acid and contraction of the muscles. However, parasitic cysts are inclined to grow in the trunk, neck, and legs because of relatively less muscle contraction and rich blood supply to these areas. Intramuscular hydatid cysts have been reported in the muscles of the chest wall and in the pectoralis major, gluteal muscles, sartorius, and quadriceps.

Typically, cystic hydatidosis consists of a single unilocular cyst. However, in as much as 30% of cases, there may be synchronous multiple cysts located in the same or multiple organs. Musculoskeletal hydatid cyst is usually associated with concomitant involvement of other solid organs. The frequency of subcutaneous tissue involvement in conjunction with involvement of other solid organs has been reported to be approximately 2%. Pre-operative diagnosis of a hydatid cyst poses diagnostic challenges, and moreover the clinically slow growing nature of the
cyst resembles soft tissue tumors. Ultrasound, CT, and magnetic resonance imaging have a valuable role in pre-operative diagnosis as well as follow-up of cases of hydatid disease. The role of fine-needle aspiration cytology (FNAC) has often been controversial as there are concerns over the microscopic spillage along the needle tract. Concerns over microscopic spillage along the needle tract at the time of needle biopsy do not appear warranted, especially when patients receive subsequent medical treatment and biopsy tracts are resected at the time of definitive surgery. In our case series, we did not subject the patient for FNAC as the diagnosis was fairly confirmed on radiological imaging and hydatid cyst disease is common in our region.

Case 1 and 2 highlights the unique presentation of isolated subcutaneous hydatid cysts. Infected subcutaneous hydatid cysts can mimic abscess there by creating a diagnostic dilemma and may easily mislead the surgeon to perform incision and drainage with the potential to cause systemic dissemination and anaphylaxis. A very high index of suspicion is required in endemic areas to consider the possibility of hydatid cysts in a subcutaneous plane which is still quite rare.

The case 3 described in our study presented a diagnostic dilemma as the swelling in the interscapular region was suspected to be a tubercular abscess which is far more common rather than a hydatid cyst. Paraspinal and spinal hydatid cysts were first described by Chaussier in 1807. The pathogenesis of muscular invasion still remains to be understood clearly. Most authors believe that the embryo can reach the muscles via the systemic circulation after leaving the intestine and passing through two important filters: The liver and the lungs.

Isolated primary hydatidosis of the urinary tract is a rare entity, and hence it poses several challenges incorrect pre-operative diagnosis. Ultrasound is considered to be the most accepted method for the differential diagnosis of a renal cystic tumor and highly sensitive (95%) for diagnosis. It is very safe and inexpensive. CT should be reserved for equivocal cases where a conclusion cannot be drawn only by USG.

There are various treatment options for the uncomplicated hydatid cyst and include needle aspiration under ultrasound guidance, laparoscopic approach, direct surgical intervention, or medical treatment with the use of albendazole. En-bloc resection without inducing rupture and spreading of the daughter cyst is a recommended treatment strategy and accepted to be curative even for intramuscular hydatid cyst. In our series, all the cases were treated by surgical resection followed by medical treatment. Vaidyanathan et al. reported 2 cases of pelvic hydatid cysts which were communicating with the bladder and they used this communication advantageously for intravesical instillation of a scolicidal agent so as to destroy the germinal layer, with a good result.

In majority of the cases in clinical practice surgery is the mainstay of treatment for hydatid cysts and offers a definite cure. The principle of surgical therapy is to excise the cyst or cysts totally whenever possible. The surgeon must be careful to remove the cyst totally avoiding spilling its contents.

### Incidence at Unusual Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>123</td>
</tr>
<tr>
<td>Thyroid</td>
<td>123</td>
</tr>
<tr>
<td>Heart</td>
<td>123</td>
</tr>
<tr>
<td>Pancreas</td>
<td>0.5-0.811122</td>
</tr>
<tr>
<td>Spleen</td>
<td>2-2.519</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>0.420</td>
</tr>
<tr>
<td>Kidney</td>
<td>1-318</td>
</tr>
<tr>
<td>Pelvis</td>
<td>2.2516</td>
</tr>
<tr>
<td>Soft tissue</td>
<td>0.5-4.710</td>
</tr>
<tr>
<td>Bones</td>
<td>1-2.429</td>
</tr>
</tbody>
</table>

Incidence of hydatid disease (Table 2) involving the spleen is about 2-2.5%. It can occur as a primary lesion or in association with hepatic, pulmonary, or multi-organ hydatidosis.

Pelvic hydatid disease is uncommon, and the reported incidence is about 2.25%. Due to its location in a fixed cavity, it manifests with pressure effects on adjacent organs such as the urinary bladder (most common) or rectum.

Hydatid cyst of the ovary is quite unusual, and the incidence lies in the range 0.2-2.25%.

Renal hydatid disease is also rare entity (1-3%) and located in the upper or lower pole, and these cysts are usually unilateral. 18% of renal hydatid cysts can rupture into the collecting system, leading to acute colicky pain and hydatiduria. However, primary hydatid disease of these structures is very rare.

Primary involvement of soft tissue by hydatid cyst is unusual even in endemic areas, and the incidence is about 0.5-4.7%. The frequency of bone involvement in hydatid cyst is 1-2.4%. It is most commonly encountered in the spine and pelvis.

According to Krasniqi et al., out of 241 patients of liver hydatidosis treated surgically, only one patient (0.4%) was found to have primary hydatid cyst in gallbladder.
The incidence of hydatid disease in pancreas is reported to be 0.5-0.8%.21,22

The incidence of hydatid cyst in breast, thyroid, and heart is reported to be 1% each by McManus et al.23

CONCLUSION

In this paper, we described 4 cases of hydatid cyst occurring at unusual sites and their surgical management. Occurrence of hydatid cysts in the subcutaneous tissue in gluteal region, anterior abdominal wall, interscapular region, and renal hydatid cysts has been reported very rarely in literature. Whenever a cystic lesion is encountered in any region of the body, the possibility of hydatid cyst though very rare should be borne in mind especially in the endemic areas. Surgical treatment remains the mainstay wherever possible and should be supplemented by medical therapy.

REFERENCES

Relationship between Educational and Socioeconomic Status and Early Diagnosis of Carcinoma Breast in Females

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2Junior Resident, Department of General Surgery, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India, 3Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer in women age around 22-59 years. It accounts for 26% of all newly diagnosed cancers in females and is responsible for 15% of cancer-related deaths in females. The incidence of breast cancer varies in different countries in the world. Women residing in industrialized countries tend to have a higher incidence than women residing in less industrialized countries.

Aim: To analyze the relationship between socioeconomic and educational status and early diagnosis of carcinoma (CA) breast. To emphasize the need for early detection of breast cancer.

Materials and Methods: Patient from any age group presenting with the lesion suspected of breast CA and proved by fine needle aspiration cytology and Tru-Cut biopsy and all relevant investigations to stage the disease such as chest X-ray, ultrasound abdomen, liver function test, mammography, and skeletal survey done for advanced cases to rule out metastasis were included.

Results: CA breast was found to be more common among females in the age group of 40-60 years (70%). Out of 150 patients, 92 patients (61.3%) were illiterate, 48 (32%) were educated up to primary level, 10 patients (6.7%) with secondary education. Out of 150 patients, 140 patients (93.3%) belonged to low socioeconomic status and 10 patients (6.7%) belonged to middle class. Impact of social inequality in cancer is not being given adequate attention in this country. Lower and middle-income group constitutes the majority of the population in our country. Hence, socioeconomic study of cancer is important for preventive measures and therapeutic action plans.

Conclusion: Impact of social inequality in cancer is not being given adequate attention in this country. Lower and middle-income group constitutes the majority of the population in our country. Hence, socioeconomic study of cancer is important for preventive measures and therapeutic action plans.

Key words: Breast carcinoma, Fine needle aspiration cytology, Mammography, Tru-Cut biopsy

INTRODUCTION

Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer in women age around 22-59 years. It accounts for 26% of all newly diagnosed cancers in females and is responsible for 15% of cancer-related deaths in females.1 The incidence of breast cancer varies in different countries in the world. Women residing in industrialized countries tend to have a higher incidence than women residing in less industrialized countries. Breast cancer distribution differs by geography, regional lifestyle, racial, or ethnic background. In general, both breast cancer incidence and mortality are relatively lower among the female populations of Asia and Africa, relatively underdeveloped nations, and nations that have not changed to the westernized reproductive and dietary patterns. In contrast, European and North American women from heavily industrialized or westernized countries have a substantially higher incidence of breast cancer. A comprehensive breast history, a thorough breast examination, and a clear record of findings and follow-

Access this article online

www.ijss-sn.com

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

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Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/194
up can detect cancer in early stage. Early diagnosis and proper referrals, availability of female doctors, facilities to detect breast cancer earlier by mammography as a tool for screening purpose, and availability of facilities for proper treatment can decrease the mortality rate in carcinoma (CA) breast. The Smith surgical papyrus (3000-2500 BC) is the first to document about, and this cancer occurred in men, and the author’s conclusion about this cancer is that there is no treatment for breast cancer. In De Medicina Celsus quoted on the importance of operations for breast cancer of earlier stage. “None of these may be removed but the cacoethes (early cancer), the rest are irritated by every method of cure. The more violent the operations are, the more aggressive they grow.” Rudolf Virchow found that CA breast arises from epithelial cells and then spreads along lymphatic vessels. He is considered as the architect of new cellular theory on pathogenesis of CA breast.

Aims
To analyze the relationship between socioeconomic and educational status and early diagnosis of CA breast. To emphasize the need for early detection of breast cancer.

MATERIALS AND METHODS
This study was conducted in 150 patients who were admitted in the Department of General Surgery, Government Rajaji Hospital, Madurai. This study which was undertaken was a prospective case series study and was started after getting due clearance from the Institute of Ethical Committee, Government Rajaji Hospital, Madurai Medical College. Inclusion criteria for patients in this study consist of patient of any age presenting with the lesion suspected of breast CA and proved by fine needle aspiration cytology (FNAC) and Tru-Cut biopsy and all relevant investigations to stage the disease such as chest X-ray, ultrasound abdomen, liver function test, mammography, and skeletal survey done for advanced cases to rule out metastasis. Patients excluded where those who presented with symptoms of the breast on clinical examination but on investigation there was no malignant pathology of breast and male patients with breast CA excluded. Patients’s data were collected in standardized pro forma which included age, socioeconomic status, level of education, duration of symptoms, and detection of lump by the patient or medical practitioner, into three class lower, middle, and upper and any previous visit to local doctor for this illness, any prior investigations performed and stage of tumor at time of presentation. Socioeconomic status defined by Kuppusamy scale was used in this study which was based on three major variables contributing to socioeconomic status which included education, occupation, and income. Based on these three variables score given and socioeconomic status classified into five class (Table 1).

In this study, upper middle and lower middle combined as middle class and upper lower and lower combined as lower class. Hence, in this study socioeconomic status classified into three class lower, middle, and upper. Literacy status classified into illiterate and educated which is further classified into primary (I-IV), secondary (high school and higher secondary), and higher education (graduate and above). People belonging to higher socioeconomic status or with higher education were not admitted in our hospital during the period of this study.

RESULTS
In our study among 150 patients 34% presented in early stage and 66% presented in late stage.

In 50-60 years; 32 patients are in Stage III, followed by 40-50 years (Table 2). Among the patients who presented in early stage, 15.2% belonged to illiterate 62.5% belonged to patients educated up to primary level and 70% of patients educated up to secondary level. In remaining 66% who presented in advanced stage of cancer 84.8% were illiterate, 37.5% were primarily educated, and 30% were secondarily educated (Table 3). In 150 patients, 30.7% of low socioeconomic status and 80% of patients belonging to middle class presented in early stage (Stage I and II) and remaining 69.3% of low socioeconomic status and

<p>| Table 1: Classification of socioeconomic class |</p>
<table>
<thead>
<tr>
<th>Score</th>
<th>Economic class</th>
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<tbody>
<tr>
<td>26-29</td>
<td>Upper</td>
</tr>
<tr>
<td>16-25</td>
<td>Upper middle</td>
</tr>
<tr>
<td>11-15</td>
<td>Lower middle</td>
</tr>
<tr>
<td>5-10</td>
<td>Upper</td>
</tr>
<tr>
<td>&lt;5</td>
<td>Lower</td>
</tr>
</tbody>
</table>

<p>| Table 2: Age distribution in the study |</p>
<table>
<thead>
<tr>
<th>Age in years</th>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
<th>Stage IV</th>
</tr>
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<tbody>
<tr>
<td>20-30</td>
<td>-</td>
<td>1</td>
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<td>5</td>
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<td>2</td>
</tr>
<tr>
<td>50-60</td>
<td>-</td>
<td>16</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>60-70</td>
<td>-</td>
<td>1</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>70-80</td>
<td>-</td>
<td>-</td>
<td>7</td>
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</tr>
</tbody>
</table>

<p>| Table 3: Distribution of stage of tumor based on literacy status of patients |</p>
<table>
<thead>
<tr>
<th>Stage of tumor</th>
<th>Illiterate</th>
<th>Primary</th>
<th>Secondary</th>
<th>Higher education</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>13</td>
<td>28</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>70</td>
<td>17</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>IV</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
20% belonging to middle class presented in late stage (Stage III and IV) (Table 4). Patient of about 32.7% who presented before 6 months of initiation of symptom were found in early Stage I and II and patients of about 67.3% who presented after 6 months of initiation of symptom were found in late stage (Stage III and IV) (Table 5). About 62.5% of patients with primary education, 70% of secondary education and 13.4% of illiterate patient presented before 6 months and were found in early Stage I and II and remaining 84.7% of illiterate, 37.5% of primary education and 30% of secondary education presented after 6 months and found to be in Stage III and IV (Table 5). Only 29.2% of low socioeconomic status but 90% of the middle class presented before 6 months and were found in Stage I and II. Remaining 70% of low socioeconomic status and 10% of the middle class presented after 6 months of initiation of symptom were found in Stage III and IV (Tables 6-9).

Majority of the patients belonging to low socioeconomic and illiterate group presented in advanced stage of breast cancer due to patient's negligence and lack of awareness about breast cancer. Delayed presentation of female breast cancer has a strong and significant attribution to patient delay which will definitely have a worse impact on stage of breast cancer.

### DISCUSSION

CA breast was found to be more common among females in the age group of 40-60 years (70%). This compares favorably with studies done by Bibb in which a maximum number of cases among African women and white women were around the age of years and 59 years, respectively. Out of 150 patients admitted, 4 patients (2.7%) presented in Stage I, 47 patients (31.3%) in Stage II, 90 patients (60%) were in Stage III, and 9 (6%) were in Stage IV. These results were not too dissimilar from a study done by Lodhi et al. where 25% of patients presented in Stage I and II. 62.7% were in Stage III, and 12% were in Stage IV. Out of 150 patients, 92 patients (61.3%) were illiterate, 48 (32%) were educated up to primary level, and 10 patients (6.7%) with secondary education. Out of 150 patients, 140 patients (93.3%) belonged to low socioeconomic status and 10 patients (6.7%) belonged to middle class. According to educational status out of 92 illiterate patients only one patient presented in Stage I, 13 patients (14.1%) presented in Stage II, 70 patients (76.1%) in Stage III, and 8 patients (8.7%) in Stage IV. Out of 48 patients who were educated up to primary level, 29.2% presented in Stage I, 22.9% in Stage II, 51.4% in Stage III, and 6.2% in Stage IV. The results were not too dissimilar from a study done by Lodhi et al. where 25% of patients presented in Stage I and II. 62.7% were in Stage III, and 12% were in Stage IV. Out of 150 patients, 92 patients (61.3%) were illiterate, 48 (32%) were educated up to primary level, and 10 patients (6.7%) with secondary education. Out of 150 patients, 140 patients (93.3%) belonged to low socioeconomic status and 10 patients (6.7%) belonged to middle class. According to educational status out of 92 illiterate patients only one patient presented in Stage I, 13 patients (14.1%) presented in Stage II, 70 patients (76.1%) in Stage III, and 8 patients (8.7%) in Stage IV. Out of 48 patients who were educated up to primary level, 29.2% presented in Stage I, 22.9% in Stage II, 51.4% in Stage III, and 6.2% in Stage IV.
level only 2 patients (4.2%) presented in Stage I and 28 patients (58.3%) presented in Stage II, 17 patients (35.4%) presented in Stage III, and one patient (2.1%) presented in Stage IV. This is quite different from a study done by O’Malley et al. where 30% of women with a low education presented with late stage disease. Of 140 patients belonging to a lower socioeconomic status only one patient presented in Stage I, 42 patients (30%) in Stage II 88 patients (62.9%) in Stage III, and 9 patients (6.4%) in Stage IV. Out of 10 patients who belonged to middle class, 3 patients (30%) presented in Stage I, 5 patients (50%) in Stage II, and 2 patients (20%) in Stage III. Out of 150 patients only 49 patients presented to the hospital for treatment before 6 months of initiation of symptoms and the remaining 101 patients came to the hospital for the first visit only after 6 months of the appearance of initial symptoms. Among 49 patients who presented before 6 months of symptoms, 4 patients were in Stage I, 44 patients in Stage II, and 1 patient in Stage I. Among illiterate group 14 patients came for first visit before 6 months of initiation of symptoms 12 patients were in early stage and 3 patients in late stage of cancer and 78 patients presented after 6 months of initiation of symptoms out of which 2 patients were in Stage II, 68 patients in Stage III, and 8 patients in Stage IV. Among patients who were educated up to primary level 30 patients came to hospital for first visit before 6 months from initiation of symptoms out of which 2 patients in Stage I and 28 patients in Stage II. 18 patients came after 6 months of initiation of symptoms out of which 17 patients in Stage III, and one patient in Stage IV. Among patients who were educated up to secondary level, 7 patients came to the hospital before 6 months from initiation of symptoms, out of which one patient in Stage I and 6 patients in Stage II. Only 3 patients came after 6 months of initiation of symptoms and were found to be in Stage III. Out of 140 patients belonging to lower socioeconomic status 41 patients (29.3%) came to the hospital for first visit before 6 months from the appearance of symptoms. Among those 41 patients, one patient (2.4%) was found in Stage I, 39 patients (95.1%) in Stage II and 1 (2.4%) patient in Stage III. 99 patients (70.7%) came after 6 months from appearance of symptoms out of which 3 patients (3.1%) in Stage II, 87 patients (87.9%) in Stage III, and 9 patients (9.1%) in Stage IV (Table 11). The results were more or less similar to the study done by Lodhi et al. who found that 64% of patients came after 6 months of symptom and out of it 60% found to be in advanced stage and only 4% in Stage II. Among 10 patients who were belonging to middle class, 8 patients presented to hospital before 6 months from initiation of symptoms out of which 3 were found in Stage I, 5 patients in Stage II and one patient in Stage III and only one patient came after 6 months of initiation of symptoms and was found to be Stage III. Among 150 patients about 5 patients came with prior investigations which included FNAC and biopsy, and they all belong to middle class and were educated. Among 150 patients lump was detected by the patient itself by 148 patients and 2 were detected by a medical practitioner. Out of 150 patients, 51 patients (34%) presented in early stage of cancer and 99 patients (66%) presented in late stage of cancer. 14 illiterate patients (15.2%), 30 patients (62.5%) of primary education and 7 patients (70%) of secondary education presented in early stage and remaining 99 patients (66%) presented in advanced stage of cancer and among them 78 patients (84.8%) were illiterate, 18 patients of primary education and 3 patients of secondarily educated presented in late stage of cancer. In 150 patients, 43 patients (37%) of low socioeconomic status and 8 patients of middle class presented in early stage (Stage I and II) and the remaining 97 patients (69.3%) of low socioeconomic status and 2 patients belonging to middle class presented in late stage.

### Table 10: Distribution of duration of illness according to socioeconomic status of patients

<table>
<thead>
<tr>
<th>Socioeconomic status</th>
<th>&lt;3 months</th>
<th>3-6 months</th>
<th>6-12 months</th>
<th>&gt;12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>11</td>
<td>30</td>
<td>71</td>
<td>28</td>
</tr>
<tr>
<td>Middle</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Higher</td>
<td></td>
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<td>-</td>
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</table>

### Table 11: Distribution of stage of tumor and duration of illness in low socioeconomic class of patients

<table>
<thead>
<tr>
<th>Stage of tumor</th>
<th>&lt;3 months</th>
<th>3-6 months</th>
<th>6-12 months</th>
<th>&gt;12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>10</td>
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<td>3</td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>-</td>
<td>1</td>
<td>65</td>
<td>22</td>
</tr>
<tr>
<td>IV</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

### Table 12: Distribution of stage of tumor and duration of symptoms in middle-class patients

<table>
<thead>
<tr>
<th>Stage of tumor</th>
<th>&lt;3 months</th>
<th>3-6 months</th>
<th>6-12 months</th>
<th>&gt;12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>III</td>
<td>-</td>
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<tr>
<td>IV</td>
<td>-</td>
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</tr>
</tbody>
</table>
of cancer (Stage III and IV). Out of 150 patients, only 49 patients presented to the hospital before 6 months from initiation of symptoms. Patients who presented before 6 months were mostly found in early stage (Stage I and II) and patients presenting after 6 months of initiation of symptom were found to be in late stage (Stage III and IV).

CONCLUSION

Impact of social inequality in cancer is not being given adequate attention in this country. Lower and middle-income group constitutes majority of the population in our country. Hence, socioeconomic study of cancer is important for preventive measures and therapeutic action plans. Many studies on socioeconomic variation in western countries observed late stage presentation of cancer and decreased survival among poor population. This study clearly displays the necessity of early medical attention to symptoms of breast cancer by creating awareness about detection of breast cancer at earlier stage and thereby improve the survival rate of patients with breast CA.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Comparative Clinical Study between Spinal Anesthesia and Sedation with Local Anesthesia in Orthopedic Procedures of Lower Limb

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Abstract

Introduction: Orthopedic anesthesia presents many challenges to anesthesiologists. Orthopedic procedures of lower limb are performed under general anesthesia, spinal anesthesia, and sedation and local anesthetic infiltration. The orthopedic patients range in age from infant to centenarian. This patient population shows the full spectrum of comorbidities. Many of the procedures are associated with significant post-operative pain. Surgery on isolated extremities can be performed using a variety of regional anesthetic techniques for both anesthesia and post-operative analgesia.

Aim of the Study: This study aimed to compare and evaluate the efficacy of sedation with local anesthesia and spinal anesthesia in orthopedic procedures of lower limb, in terms of time taken and subjective analgesia.

Materials and Methods: A prospective, randomized controlled clinical trial with two groups of patients, 47 each, was conducted. The age range was 20-55 years. Group A was administered sedation, local anesthesia with fentanyl, midazolam, and propofol infusions were used, and to provide post-operative analgesia, the surgeon used lignocaine and bupivacaine to infiltrate ports and joint cavities. Group B patients were administered spinal anesthesia with 7.5 mg of simple bupivacaine. Different time duration taken during anesthesia and subjective analgesia were evaluated and compared using standard statistical methods.

Results: The mean pre-anesthetic period in Group A and B was 36.2 ±4.80 and 58.64 ± 6.22, respectively. The mean time to anesthetize in Group A and B was 26.84 ± 8.20 and 39.50 ± 3.74, respectively. The mean duration of the surgical procedure in Group A and B was 56.48 ± 8.44 and 57.22 ± 3.86, respectively. The mean time spent in recovery room to ambulation in minutes in Group A and B patients was 44.68 ± 6.80 and 74.92 ± 11.24, respectively. The visual analog scale (VAS) score of pain during the surgery in both the groups was 0. The post-operative average VAS score on an average was 3-4 in Group A and 5 to 7 in Group B.

Conclusions: The mean values observed for the time of pre-anesthetic period, the mean time to anesthetize, mean duration of the surgical procedure, and mean time spent in recovery room to ambulation were significantly lower in patients anesthetized with sedation and local anesthetic than the spinal block; this technique was found to be a good choice for short orthopedic surgeries of lower limb.

Key words: Anesthesia, Arthroscopy, American Society of Anesthesiologists and analgesia, General anesthesia, Joint, Local anesthesia

INTRODUCTION

Analgesia is a major concern of the anesthetist and orthopedic surgeon while undertaking surgical procedures and forms an object of discussion to understand and achieve it. Pediatric spinal anesthesia was first described by August Bier in 1899. Analgesia and muscle relaxation with spinal anesthesia is acceptable; easy to perform; uses small dose of anesthetic; and offers a quick onset. The disadvantages are relatively short duration and post-operative pain when it wears off. Bupivacaine is used for longer procedures, but there is a need to intensify and increase the duration of sensory block without increasing the intensity and duration of motor block, thus prolonging the duration of post-operative analgesia.¹ Knee arthroscopy is usually...
performed under spinal anesthesia; contraindications are rare. However, in some situations, there are restrictions on its use based on the anesthetic risk. Arthroscopy under sedation and local anesthesia is not considered to be novel; remains a source of strong critical argument and is not proclaimed. Review of literature shows divergent opinions about this topic; some affirming that it is possible as a safe and effective method, few others support the view that it should only be used for diagnostic surgery and some state that it is unsafe. Arthroscopy is a major advancement in the orthopedic surgeries of the century; less invasive. If good post-operative analgesia is provided through local anesthetic techniques, it will help reduce the hospital stay and avoids unnecessary expenses. Sedation and local infiltration at port sites with lignocaine initially and later with bupivacaine followed by intra-articular local anesthesia of the knee is proved as a simple, safe technique accepted by patients. There is low morbidity, reducing analgesic intake as well as reducing hospital stay, and thus leads to a reduction in costs as quoted by Moreno-Regidor et al., who conducted a study on 56 patients using local anesthesia and sedation. Their reports showed that it was necessary to reinforce the pain analgesics in portals or during knee valgus/varus stress maneuvers in six patients. Regional anesthesia and general anesthesia are of greater convenience for the surgeon and better analgesia to the patient, but the disadvantages are risks for the patient and discomfort during recovery, low back pain, urinary retention, and post-puncture headaches. In the context of choice of anesthesia for lower limb surgeries, especially arthroscopy, the present study was conducted to compare and evaluate the efficacy of local anesthesia and spinal anesthesia in orthopedic procedures in terms of duration and analgesia.

MATERIALS AND METHODS

A prospective, non-blind, randomized, comparative and analyst clinical blind trial was conducted on 94 patients randomized using online randomization services at www.randomization.com. Institutional Ethical Committee clearance was obtained. A committee-approved consent form was used for the patients. The patients were aged between 20 and 55 years. All the patients were with American Society of Anesthesiologists risk I or II. The patients were divided into two groups; Group A were administered sedation, local anesthesia with fentanyl, midazolam, and propofol infusions were used, and to provide post-operative analgesia, the surgeon used lignocaine and bupivacaine to infiltrate ports and joint cavities; Group B patients were administered spinal anesthesia with 7.5 mg of simple bupivacaine.

Inclusion Criteria
1. Patients aged between 20 and 55 years were included.
2. Patients with minor procedures such as diagnostic and therapeutic arthroscopy, meniscectomy, meniscal repair, joint lavage, and excision of osteochondral lesions were included in the study.

Exclusion Criteria
1. Patients aged below 20 and above 55 years were excluded.
2. Patients in whom procedures conducted reactive to local anesthetics such as lidocaine, bupivacaine, and ropivacaine were excluded.
3. Patients with combined procedures such as arthroscopy and debridement and osteotomy were excluded.
4. Patients with signs of acute inflammation were excluded from the study.

For both the groups, pre-anesthetic medication of 50 mg of ranitidine intravenous (IV) and metoclopramide 10 mg IV was given. Sedation with midazolam 0.04 mg/kg (IV) with dextrose with normal saline IV at 10 ml/kg was started. Pre-operative monitoring was done with ECG, oxymetry, and noninvasive blood pressure. Oxygen was given through face mask at 4-5 L/min, and initial vital signs and pulse rate were monitored. Intra-operative pain was assessed by visual analog pain scale (VAS). Statistical Methods

Socialessciencestatistics.com was used: Data collected were quantitative and qualitative variables. Chi-square
calculator, $5 \times 5$ contingency table, was used to calculate the significance of values obtained comparing both groups.

**OBSERVATIONS AND RESULTS**

There were 47 patients in Group A and 47 patients in Group B. There were 32 males and 15 females in Group A and 35 males and 12 females in Group B. The mean age was 35.6 ± 4.8 years and 37.2 ± 6.2 years in Groups A and B, respectively. The mean weight in Group A was 68.40 ± 11.16 kg, height was 1.54 ± 0.086 m, and the mean body mass index (BMI) was 26.44±5.60. The mean weight in Group B was 71.32 ± 08.16 kg, height was 1.54 ± 0.068 m, and the mean BMI was 28.22 ± 6.42 (Table 1).

Among the various indications for orthopedic surgery the meniscal injury was found in 15 of Group A and 13 of Group B patients; total 28/94 (29.78%); diagnostic arthroscopy were performed in 31/94 (32.97%) patients. Meniscal repair and Joint lavage was done in 11.70% patients each (Table 2).

The mean pre-anesthetic period in Group A was 36.2 ± 4.80 and the mean pre-anesthetic period in Group B was 58.64 ± 6.22. The mean time to anesthetize in Group A was 26.84 ± 8.20 and in Group B it was 39.50 ± 3.74. The mean duration of the surgical procedure in Group A was 56.48 ± 8.44 and in Group B it was 57.22 ± 3.86. The mean time spent in recovery room to ambulation in minutes in Group A was 44.68 ± 6.80 and in Group B it was 74.92 ± 11.24. The VAS score of pain during the surgery in both the groups was 0. The post-operative average VAS score on an average it was 3-4 in Group A and to 7 in Group B (Table 3).

For the above data of both groups, the Chi-square statistic calculated was 17.40 using Chi-square calculator with $5 \times 5$ contingency table and the $P = 0.00161$ with $P$ significant at 0.05.

**DISCUSSION**

Among the various methods of anesthesia used in performing lower limb surgeries, two methods are used in the present study. (1) Spinal block anesthesia using 7.5 mg of plain bupivacaine (1.5 ml) was injected into the CSF. (2) Sedation and intra-articular infiltration of the joint cavity with 20 cc of simple lidocaine at 2% in addition to joint lavage with 6 ml of bupivacaine 500 mg (25 cc) of lidocaine was added per liter to the 3 L bags, so the local anesthetic concentration was 0.05%. The other methods available are the general regional peripheral anesthesia (inhaled and/or intravenous) and neuraxial regional blockade. The advantages and disadvantages are well documented in the literature.

Mondino working with sedation and local anesthesia in his study reported a 1.6% failure rate in which conversion to balanced general anesthesia was required in a series of 98 patients. In the present study, no patient was converted to general anesthesia in either of the Group A or B. Maldini and Miskulin while evaluating absence of pain, movement, and the patient referring to pain during the procedure reported a 96.6% success rate; they used local anesthesia and a propofol infusion. In the present study, apart from patients undergoing arthroscopy, patients undergoing meniscectomy - 28 (29.78%), meniscal repair - 11 (11.70%), joint lavage - 11 (11.70%), and excision of osteochondral lesions - 13 (13.82%) also were not converted to general anesthesia. In Group A with sedation and local anesthesia, the mean time to anesthetize was 26.84 ± 8.20 min, the mean duration of the surgical procedure was 56.48 ± 8.44 min, the mean time spent in recovery room to ambulation was 44.68 ± 6.80 min, and the pain measured with VAS score was on average of 3-4. This was significant when compared to the Group B patients wherein the mean time to anesthetize
Valsalan and Chandran: Comparison of Spinal Anesthesia and Sedation with Local Anesthesia in Lower Limb Surgeries

was 39.50 ± 3.74 min, the mean duration of the surgical procedure was 57.22 ± 3.86 min, the mean time spent in recovery room to ambulation was 74.92 ± 11.24 min, and the pain measured with VAS score was on average of 5-7. For the above data of both groups, using Chi-square calculator with 5 × 5 contingency table, the chi-square statistic calculated was 17.40 and the P = 0.00161 with P significant at 0.05. Takahashi et al.14 reported from their study that there was good pain control among their 63 patients while operated using sedation and local anesthesia which was similar to the present study. They also concluded that the most pain was experienced while intra-articular injection of lidocaine was being given. While reviewing literature on spinal block anesthesia for lower limb orthopedic surgeries, it was found that in a study by Ben-David et al.15 who analyzed spinal anesthesia for knee arthroscopy and other surgeries on lower limb, they could not achieve non-surgical anesthesia in four of their 15 patients using 5 mg of bupivacaine, but there were no failures at doses of 7.5 mg and above. In the next study, by the same authors, the failure occurred in six of 25 patients who received only 5 mg of bupivacaine, but in none of the 25 patients who received 10 mcg of fentanyl with the same dose of bupivacaine. In the present study, for Group B patients, spinal block technique with 7.5 mg of bupivacaine at 0.5% (1.5 cc) was used, reaching an appropriate surgical level (T10), and the patients reported a VAS of 0 in all the 47 patients. One of the main causes of post spinal headaches is described in the literature as the chosen diameter of the spinal needle. Reina et al.16 stated in their study that Whitacre 25 needles leave a dual hole by separation and disruption of the collagen fibers with an inflammatory component. They describe that an edema produced by the inflammation initiated by the physical trauma leads to closure of the hole in the dura mater, initiating stoppage of CSF leak which subsequently reduces post-spinal headache. In the present study, Whitacre needles are used in all the patients and no complaint of post-spinal headache was reported. Sedation and local anesthesia for lower limb minor procedures is ideal as it has less surgical and recovery time as found in Group A patients of this study. Patients with combined procedures such as arthroscopy and debridement and osteotomy were not included in this study as these take longer time and unpredictable bleeding. Tourniquet cannot be used as the limb above the anesthetic area is not anesthetized. However, during the post-operative recovery period, the analgesia assessed with VAS score in sedation and local anesthesia (Group A) was 3-4 when compared to spinal block (Group B) with 5-7 score. In Group A patients, the post-operative analgesia could be started immediately in the recovery room unlike in the Group B patients in whom it is necessary to wait for the anesthetic recovery time. Unlike in patients undergoing surgery under general anesthesia, there is no necessity of giving opioids in the sedation and local anesthetic group. In patients with spinal block, though the analgesia persists in the post-operative period, there is associated motor deficit, and immediate post-operative rehabilitation is not possible. In Group A patients, the duration of surgery, duration of inducing anesthesia, time spent in recovery, early rehabilitation, and good VAS score of analgesia were possible with least complications. The present study is in concurrence with studies of Moreno-Regidor et al.,10 Mondino,12 and Maldini and Miskulin13 who also observed that sedation and local anesthesia for performing minor procedures of lower limb are effective, practical, of low cost, are safe, and with shorter hospital stay.

REFERENCES


How to cite this article: Valsalan VK, Chandran PS. Comparative Clinical Study between Spinal Anesthesia and Sedation with Local Anesthesia in Orthopedic Procedures of Lower Limb. Int J Sci Stud 2017;5(1):228-231.

Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study of Preservation versus Elective Division of Ilioinguinal Nerve in Open Mesh Repair of Inguinal Hernia

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Abstract

Introduction: Chronic postherniorrhaphy groin pain is defined as pain lasting for more than 3 months after surgery. It is one of the most important complications occurring after inguinal hernia repair and it occurs with greater frequency than previously thought.

Aim: The purpose of this study is to evaluate the effect of routine ilioinguinal nerve excision compared to nerve preservation on chronic groin pain and other sensory symptoms when performing Lichtenstein tension free inguinal hernia repair.

Materials and Methods: A total of 60 patients underwent open mesh repair of inguinal hernia were included in the study. The ilioinguinal nerve was identified and preserved in 30 patients (Group A), and elective division of the ilioinguinal nerve was done in 30 patients (Group B). The patients were evaluated for pain and other sensory symptoms at post-operative day 1 (POD-1), at 1 month, at 3 months, and at 6 months after surgery by using 4-point verbal scale.

Results: About 50 out of 60 patients completed the study protocol fully. The incidence of post-operative groin pain in this study compared ilioinguinal nerve preservation versus routine excision of ilioinguinal nerve showing was 24 versus 19 at POD-1; 13 versus 10 at 1 month, 26.9% versus 12.5% at 3 months, and 19.2% versus 8.2% at 6 months. The incidence of hypesthesia was 57.6% versus 62.5% at POD-1, 26.9% versus 37.5% at 1 month, and 11.5% versus 16.6% at 6 months. The incidence of post-operative numbness compared ilioinguinal nerve preservation versus nerve excision, results showed 23% versus 25% at 1 month and 11.5% versus 12.5%.

Conclusion: The prophylactic excision of the ilioinguinal nerve during Lichtenstein mesh hernia repair decreases the incidence of chronic groin pain after surgery.

Key words: Ilioinguinal nerve, Inguinal hernia, Lichtenstein, Neurectomy, Mesh repair

INTRODUCTION

Hernias may be generally defined as a “protrusion of a viscus or part of a viscus through an abnormal opening in the walls of its containing cavity.”⁵ Chronic postherniorrhaphy groin pain is defined as pain lasting for more than 3 months after surgery. It is one of the most important complications occurring after inguinal hernia repair and it occurs with greater frequency than previously thought. A review of studies published between 1987 and 2000 showed an overall incidence of 25% with 10% of patients having pain fitting a definition of moderate or severe.² Incidence of long-term (≥1 year) post-operative neuralgia reported for Lichtenstein repair of inguinal hernia range from 6% to 29%.³ Inguinodynia is the recommended generic term for chronic groin pain after hernia repair and should replace “neuralgia or mesh inguinodynia” to promote uniformity and avoid confusion in the literature.⁴ In cases that involves workman’s compensation issue, treating a post-surgical patient becomes complicated. Although most legal cases result in out of court settlement, worth noting is the fact that 5-7% of patients with post herniorrhaphy neuralgia occurring after inguinal hernia repair...
Many investigators and pioneers started to accept. The concept of routine neurectomy in surgery is not unique to inguinal hernia repairs. Routine neurectomy is often performed during axillary and neck dissections in which the intercostobrachial and greater auricular nerves are sacrificed. Routine ilioinguinal nerve excisions has been proposed as a means to avoid the troubling complication of long term postherniorrhaphy neuralgia. Theoretically excision of ilioinguinal nerve would eliminate the possibility of inflammation neuralgia arising from entrapment, neuroma, fibrotic reactions yet controversies persists and the procedure is not widely accepted. Many investigators and pioneers started to establish algorithm for management of these chronic pain syndromes; others tried to define a method to prevent this complications rather than treat it. A proposed mechanism for the development of post-operative chronic groin pain is inflammation and fibrosis induced by the mesh, which is in close proximity to the ilioinguinal nerve. The purpose of this study was to evaluate the effect of routine ilioinguinal nerve excision compared to nerve preservation on chronic groin pain and other sensory symptoms when performing Lichtenstein inguinal hernia repair.

**Aim**

Aim of the study was to evaluate the effect of preservation versus elective division of the ilioinguinal nerve on chronic groin pain and hypesthesia after Lichtenstein tension free inguinal hernia repair using polypropylene mesh.

**MATERIALS AND METHODS**

This is a comparative study was conducted in the Department of Surgery, Sivagangai Medical College Hospital. In this study, the clinical material consists of patients admitted with uncomplicated inguinal hernia (both males and females), 30 cases with ilioinguinal nerve preservation (Group A), and 30 cases with elective division of the nerve (Group B).

**Exclusion Criteria**

The patients below 18 and above 60 years, diabetes mellitus, complicated inguinal hernias and recurrent hernias, previous surgery in the inguinal region, mesh allergy and subsequent hernia repair in the observation period, previous history of trauma and pain at the inguinal region.

**RESULTS**

A total of 60 patients of uncomplicated inguinal hernia who underwent Lichtenstein mesh hernioplasty included for this Prospective comparative study, 4 of 30 patients in nerve preservation and 6 of 30 patients in nerve excision group were lost to follow-up, leaving 50 patients who completed the study protocol fully. 26 patients with Nerve preservation (Group A) and 24 patients with nerve excision (Group B) were considered for the study.

In this study, preservation of ilioinguinal nerve during Lichtenstein inguinal hernia repair was performed in 26 patients mean age of 31 ± 20 years including 25 (96%) men and 1 (4%) women. Of the 26 patients, 20 (76%) presented with swelling in the groin only, where 6 (24%) presented with swelling associated with pain. Of the 25 male patients, 4 (16%) showed features of bladder outlet obstruction, 7 (28%) had constipation, and 1 (4%) had chronic cough. Moreover, 1 woman had no obvious predisposing factors. Regarding type, 15 (58%) patients had right sided inguinal hernia and 11 (42%) had left side inguinal hernia. Of the 26 patients, 21 (81%) cases were indirect inguinal hernia and 5 (19%) cases were direct hernia. Routine excision of ilioinguinal nerve during Lichtenstein hernia repair was performed in 24 patients; all are male patients with mean age of 39 ± 14 years. Of the 24 patients, 17 (71%) patients presented with swelling in the groin only, whereas 7 (29%) are presented with swelling associated with pain. 6 (25%) patients showed features of bladder outlet obstruction, 5 (21%) had constipation, 2 (8%) had chronic cough. Of the 24 patients, 16 (67%) had right sided inguinal hernia, 6 (25%) had left sided inguinal hernia, and 2 (8%) were bilateral. 18 (78%) patients were indirect inguinal hernia, and 6 (25%) were direct hernia (Table 1).

Post-operative chronic groin pain, hypesthesia, and numbness have been compared between two groups (A and B), at post-operative day 1 (POD-1), at 1 month, at 3 months, at 6 months.

| Table 1: Comparison of study groups |
|-----------------------------------|------------------------------|------------------------------|
| Variables                         | Nerve preservation (Group A) | Nerve excision (Group B)     |
| Gender                            | Male                        | Female                       |
| Mean age                          | 31±20                       | 39±14                        |
| Mode of presentation              | Swelling only               | Swelling with pain           |
| Strain factors                    | BOO                         | Constipation                 |
| Location                          | Right                       | Left                         |
| Type                              | Direct                      | Indirect                     |
| Age                               | 25                          | 24                           |
|                                  | 01                          | 0                            |
|                                  | 20                          | 17                           |
|                                  | 06                          | 07                           |
|                                  | 04                          | 06                           |
|                                  | 07                          | 05                           |
|                                  | 01                          | 02                           |
|                                  | 15                          | 16                           |
|                                  | 11                          | 06                           |
|                                  | 0                           | 02                           |
|                                  | 05                          | 06                           |
|                                  | 21                          | 18                           |
In this study, the incidence of post-operative neuralgia in Group A (ilioinguinal nerve preservation) was compared with Group B (ilioinguinal nerve excised) during Lichtenstein hernioplasty. The results of the follow-up visits are 24 versus 19 (√0.05) at POD-1; 13 versus 10 (√0.05) at 1 month; 10 versus 2 (√0.05) at 3 months; and 8 versus 1 (√0.05) at 6 months in Groups A and B, respectively (Table 2).

In this study, severity of pain was compared between Groups A and B, by using 4-point verbal scale. The pain was absent in 2 versus 5, mild in 8 versus 7, moderate in 13 versus 10, and severe in 3 versus 2 at POD-1; absent in 13 versus 14, mild in 6 versus 10, moderate in 6 versus 0, and severe in 1 versus 0 at 1 month; absent in 15 versus 22, mild in 7 versus 2, moderate in 2 versus 0, and severe in 1 versus 0 at 3 months; absent in 19 versus 23, mild in 5 versus 1, and moderate in 3 versus 0; severe in 0 versus 0 months in Groups A and B, respectively. The mean severity score by using 4-point verbal scale in patients who reported post-operative neuralgia was 1.65 ± 0.79 versus 1.37 ± 0.92 at POD-1, 0.81 ± 0.94 versus 0.42 ± 0.50 at 1 month, 0.58 ± 0.81 versus 0.08 ± 0.28 at 3 months, and 0.39 ± 0.09 versus 0.05 ± 0.20 at 6 months in Groups A and B, respectively. There was no statistically significant difference of post-operative neuralgia (√0.05) at POD-1, at 1 month, and statistical significance at 3 months and at 6 months.

In this study, the incidence of post-operative groin pain was compared between Groups A and B. The results of the follow-up visits are 57.6% versus 62.5% (√0.05) at POD-1, 26.9% versus 37.5% (√0.05) at 1 month, 19.2% versus 20.8% (√0.05) at 3 months, and 11.6% versus 16.6% (√0.05) at 6 months in Groups A and B, respectively. Here, the √value was found to be insignificant (√0.05) (Table 3).

In this study, the incidence of post-operative numbness was compared between Groups A and B. The results of the follow-up visits are 19.2% versus 12.5% (√0.05) at POD-1, 23% versus 25% (√0.05) at 1 month, 15.3% versus 20.8% (√0.05) at 3 months, and 11.5% versus 12.5% (√0.05) at 6 months. The difference was insignificant (√0.05) (Table 4).

DISCUSSION

The incidence of post-operative groin pain in this study compared ilioinguinal nerve preservation versus routine excision of ilioinguinal nerve showing the results 24 versus 19 at POD-1; 13 versus 10 at 1 month comparable with study conducted by Dittrick et al., 2004;7 26.9% versus 12.5% at 3 months correlates well with the study done by Malekpour et al., 2008;12 19.2% versus 8.2% at 6 months correlates well with studies done by Mui et al., 2006;13 and Dittrick et al. 2004.7 Here, the incidence of pain at POD-1 is not considered for post-operative chronic groin pain. The above table shows the incidence of hypesthesia in the present study compared with two other studies. In the present study, the incidence of post-operative hypesthesia at groin between ilioinguinal nerve preservation and nerve excision during surgery. The results obtained are 57.6% versus 62.5% at POD-1; 26.9% versus 37.5% at 1 month; and 11.5% versus 16.6% at 6 months are comparable with studies conducted by Malekpour et al. 2008;12 and Mui et al., 2006,12,13 In the present study, the incidence of post-operative numbness compared ilioinguinal nerve preservation versus nerve excision, results showing 23% versus 25% at 1 month, and 11.5% versus 12.5% are comparable with results of studies conducted by Picchio et al., 2004;10 and Mui et al., 2006.13

CONCLUSION

The prophylactic excision of ilioinguinal nerve during Lichtenstein mesh hernia repair decreases the incidence of chronic groin pain after surgery. Furthermore, the procedure is not significantly associated with additional morbidities in terms of local cutaneous neurosensory disturbances. Although the study sample and follow period
is short in this study than reported by many previous studies, it is still wise to recommend ilioinguinal neurectomy in patients undergoing anterior inguinal hernia mesh repair. Hence, when performing Lichtenstein inguinal hernia repair, routine ilioinguinal neurectomy is a reasonable option.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Cytoradiological Analysis of Thyroid Lesions: A Clinical Study

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Abstract

Introduction: Thyroid nodules are common in the general population. Managing patients with thyroid nodules can be challenging. Patients harboring malignancies require surgical intervention which is challenged by anesthesia, size, age, etc., and therefore an accurate preoperative diagnosis is paramount. Hence, FNA was introduced as an effective means to evaluate the thyroid nodule.

Materials and Methods: Hundred patients attending the thyroid clinic at INMAS hospital were included in the study. The medical records of these cases were reviewed to identify the demographics of the patients and the indication for FNA. Thyroid status and complete blood counts were also obtained in addition to the ultrasound findings.

Results: There were 92 females and 8 males with an age range of 5-80 yr. Indications for FNA included abnormal neck physical examination, abnormal radiographic findings, and symptoms of thyrotoxicosis or compression. Of the 100 FNAs, 6 had a cytologic diagnosis of carcinoma (with 2 papillary carcinoma), 5 “suspicious” for carcinoma, neoplasm, or atypia, 81 were benign with a diagnosis of colloid goiter, nodular colloid goiter and cystic change in colloid goiter, 7 had lymphocytic thyroiditis and 2 had granulomatous inflammation.

Conclusion: The performance characteristics, low cost, and low complication rate support the use of FNA as a screening tool to identify these malignancies. However, the combination of various diagnostic modalities, instead of a single modality, will give optimal results and better patient management.

Key words: Analysis, Thyroid, Lesions

INTRODUCTION

Thyroid nodules are common in the general population. The estimated prevalence of thyroid nodularity have been demonstrated in autopsy studies to be 19-35%¹,² Of these nodules, less than 5-10% are malignant.² Hence the incidence of malignancy is quite low compared to the overall incidence of thyroid lesions. So, the goal of the diagnostic work up is to select patients those who are more likely to harbor malignancy. The thyroid gland is the largest endocrine gland. Its superficial location allows its evaluation by physical examination, ultrasonography and fine needle aspiration.

Fine-needle aspiration (FNA) is an important diagnostic tool for the evaluation of thyroid lesions because of its low cost, ability to prevent unnecessary surgery in cases with benign diseases, and ability to accurately characterize malignant lesions hence guiding therapy.

Studies have shown diagnostic accuracy of thyroid FNA to be about 95%; additionally, FNA has been shown to perform better than ultrasonography and radionucleotide scans in terms of sensitivity, specificity, and positive and negative predictive values.³,⁴ However, the diagnostic utility of FNA is highly dependent on the expertise of the cytopathologist.

Our objective is to evaluate the cytoradiologic findings of thyroid lesions in the patient population attending the INMAS hospital.

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MATERIALS AND METHODS

Hundred patients attending the thyroid clinic at INMAS hospital were included in the study. The medical records of these cases were reviewed to identify the demographics of the patients and the indication for FNA. Thyroid status and complete blood counts were also obtained in addition to the ultrasound findings.

RESULTS

There were 92 females and 8 males with an age range of 5-80 yr. Indications for FNA included abnormal neck physical examination, abnormal radiographic findings, and symptoms of thyrotoxicosis or compression. The results are summarized in Tables 1-3.

Of the 100 FNAs, 6 had a cytologic diagnosis of carcinoma (with 2 papillary carcinoma), 5 “suspicious” for carcinoma, neoplasm, or atypia, 81 were benign with a diagnosis of colloid goiter, nodular colloid goiter and cystic change in colloid goiter, 7 had lymphocytic thyroiditis and 2 had granulomatous inflammation.

Colloid adenomatoid nodules were characterized by cellular smears with clusters of uniform follicular cells in a background of abundant colloid, often thin and watery. Focal Hurthle cell change, as well as the presence of pigment-laden macrophages and multinucleated histiocytes, was evident. Papillary thyroid carcinoma showed cellular smears with scanty background colloid. A few cases showed well-formed papillary fragments of neoplastic epithelium with fibrovascular cores. However, more common was the presence of small tissue fragments in a monolayered sheet-like architecture. Higher magnification revealed characteristic intranuclear inclusions, occasional nuclear grooves, and fine dusty chromatin. Follicular neoplasms were characterized by cellular smears with abundant proliferation of neoplastic epithelium in prominent microfollicular architecture. Characteristic nuclear features of a papillary carcinoma were absent. The microfollicles tended to be approximately of the same size.

In Benign lesions the cytoradiological correlation was accurate. The USG findings were regular margins, perilesional vascularity, with or without cystic degeneration and no significant lymphadenopathy.

In case of follicular carcinoma irregular margins and central and perilesional vascularity were reported with a single case showing lymphadenopathy.

However a case of papillary carcinoma was missed on radiological evaluation. In addition borderline lesions radiological findings were non contributory.

Taking a cut off of Hb level of 12 and 13 g/dl respectively for females and males, anemia was found in 29 females and 1 male. WBC counts and platelets were within normal limits.

DISCUSSION

In the general population, thyroid nodules are quite common, but the vast majority of these nodules are benign. Managing patients with thyroid nodules can be challenging. Patients harboring malignancies require surgical intervention which is challenged by anesthesia, size, age, etc., and therefore an accurate preoperative diagnosis is paramount. Hence, FNA was introduced as an effective means to evaluate the thyroid nodule. FNA is a cornerstone in evaluation of solitary thyroid nodules. It is the preoperative screening method of choice as it distinguishes benign from malignant quite effectively. In the hands of expert cytologists the accuracy is 98%. The diagnosis is correct in 90% of anaplastic and medullary carcinoma. However, in case of follicular carcinoma, the accuracy is about 40% as FNAC fails to distinguish between benign and malignant lesions due to overlapping features. 5

Studies report excellent performance parameters for FNA, with some showing FNA outperforming ultrasonography and radionucleotide scans.6-8

Corrias et al. evaluated and compared the diagnostic accuracies of various modalities such as clinical, laboratory,
and imaging data collected retrospectively in a group of pediatric patients with thyroid nodules submitted for FNAs. They looked at (1) symptoms of neck compression (2) cervical adenopathy (3) thyroid function, calcitonin level, and antithyroid antibody titers (4) ultrasonography (5) (99m)Tc scintiscanning, and (6) cytology obtained with FNA. The patients were divided into two groups, those with benign and malignant lesions. Patients and nodule characteristics were analyzed statistically to determine their strength of association with the presence of thyroid cancer. Among clinical findings, only cervical adenopathy was significantly higher in the cancer group (P<0.006). Thyroid function and antibody titers were similar in the two groups, whereas the serum calcitonin level was elevated in only one patient with a malignant lesion. Among ultrasonography findings, no significant statistical difference was found between the two groups regarding number, size, growth progression, or hypoechoic characteristics of the nodules. Regarding scintigraphic findings, no significant difference was found between the two groups. However, a positive correlation (P < 0.0001) was found between FNAC findings and histologic diagnoses. Based on a multiple regression analysis, the study concluded that only FNA significantly contributed in detecting thyroid malignancy in childhood and adolescence, offering the best sensitivity, specificity, and accuracy in detecting malignancy compared with conventional approaches.

Limitations of the FNA include the physician's expertise, which affects sampling, and the expertise of the cytopathologist interpreting the specimen. Both may affect the number of false-positives and false-negatives. Additionally, difficulties include interpreting follicular lesions (benign vs malignant), Hurthle cell lesions and lymphocytic lesions (lymphocytic thyroiditis vs lymphoma).

Unsatisfactory FNAs often lead to repeat procedures and may force surgical intervention or a delay in diagnosis. The presence of atypical cells may reflect an underlying malignancy, but may also subject the patient to unnecessary surgical intervention.

Features suggestive of malignancy on ultrasonographic evaluation include hypoechoic pattern, incomplete peripheral halo, irregular margins, internal microcalcification and presence of cervical lymphadenopathy. Features pointing to benign disease include variable echogenicity, multinodularity, large cystic lesion and perilesional vascularity. In our study In Benign lesions the cytoradiological correlation was accurate. The USG findings were regular margins, perilesional vascularity, with or without cystic degeneration and no significant lymphadenopathy.

In case of follicular carcinoma irregular margins and central and perilesional vascularity were reported with a single case showing lymphadenopathy.

However a case of papillary carcinoma was missed on radiological evaluation. In addition borderline lesions radiological findings were non contributory.

CONCLUSION

The performance characteristics, low cost, and low complication rate support the use of FNA as a screening tool to identify these malignancies. However, the combination of various diagnostic modalities, instead of a single modality, will give optimal results and better patient management.

REFERENCES

Cardiovascular Diseases and Periodontal Diseases: Review and Update

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Abstract

Accumulated evidence has strongly suggested that the long-term effects of periodontal diseases can be linked to more serious systemic conditions such as cardiovascular diseases (CVD) and diabetes. Especially a prevalence of coronary heart disease is found to be significantly increased in patients with periodontitis after adjusting the risk factors such as smoking, diabetes, and blood pressure. Furthermore, various studies have shown that Porphyromonas gingivalis, a major periodontal pathogen is able to exacerbate atherosclerosis following oral-hematogenous spread due to the bacteremia, caused by P. gingivalis, endothelial cells activate various adhesion molecules, thus increasing the likelihood of macrophage diapedesis and subsequent conversion to foam cells and further atheroma progression. These findings indicate the tight relationship between periodontal pathogens and CVD.

Key words: Atherosclerosis, Cardiovascular, Infection, Periodontitis, Risk factor

INTRODUCTION

The periodontal diseases are highly prevalent and can affect up to 90% of the worldwide population.¹ Gingivitis, the milder form of periodontal disease is caused by the bacterial biofilm (dental plaque). The association of coronary heart disease and periodontal disease may be due to an underlying response trait, which places an individual at high risk for developing both periodontal disease and atherosclerosis. It was suggested that periodontal disease, once established provides a biological burden of endotoxin (lipopolysaccharide) and inflammatory cytokines, especially thromboxane A2, prostaglandin E2,² interleukin (IL1β), and tumor necrosis factor-beta, which serve to initiate and exacerbate atherogenesis and thrombembolic events.¹

International Classification of Diseases, 9th Revision defined diseases of the circulatory system as follows: (1) Ischemic heart diseases, (2) cerebrovascular diseases, (3) diseases of arteries, arterioles and capillaries (known as peripheral vascular disease), arterial septal vascular disease (ASVD) affect the heart and blood vessels; which is a major component of the cardiovascular system (CVS).² It is a chronic process over many years but it can cause acute clinical events including acute coronary syndrome (ACS), myocardial infarction (MI), and strokes.¹

CARDIOVASCULAR DISEASE (CVD)

It is frequent nowadays. Many patients with heart disease require dental treatment. Various surveys have suggested that dental disease may possibly contribute to the development of atherosclerosis and MI. Anxiety or pain during dental treatment can cause an outpouring of adrenaline which can both greatly increase the load on heart and also precipitate dangerous dysrhythmia.

PERIODONTAL DISEASE

There are evidences that dental infection, particularly periodontal disease, is possible a risk factor for atherosclerosis coronary artery diseases. Patients who have valvar defects (congenital or acquired as result of post-rheumatic fever) or some other congenital defects such a septal defects or who have prosthetic valves, should receive antibiotic therapy

Access this article online

Month of Submission : 02-2017
Month of Peer Review : 03-2017
Month of Acceptance : 03-2017
Month of Publishing : 04-2017

www.ijss-sn.com

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Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/198
as prophylaxis before dental extraction (high-risk group), scaling or periodontal surgery. These are likely to release a significant number of bacteria from the gingiva, particularly periodontal pockets. The role of periodontal infection/inflammation is a risk factor for atherosclerosis.

These observations are further corroborated in animal studies that demonstrate that oral infection of atherosclerosis-prone (apolipoprotein E-deficient) mice with P. gingivalis resulted in accelerated atherosclerosis and the concomitant presence of Porphyromonas gingivalis DNA in their aortic tissue (Lalla et al., 2003).

A recent review of the epidemiologic pattern of periodontitis report a range in prevalence of severe periodontitis from 1% among 20-29 years to 39% among individuals more than 65 years of age.

Poor periodontal status was significantly associated with increased C-reactive protein (CRP) and fibrinogen levels. Another group investigated the association between periodontitis and subclinical atherosclerosis, commonly measured by means of carotid artery intima-media thickness (cIMT) assessments. Increased cIMT has been documented to be directly associated with increased risk of MI and stroke (O’Leary et al., 1999). Becker et al. (2001) provided the first evidence that periodontitis may be linked to subclinical atherosclerosis.

Several studies have shown that periodontitis is associated with heart disease. While a cause and effect relationship has not yet been proven. Patient at risk for infective endocarditis may require antibiotic before a dental procedure. Cardiologist and periodontist will decide if the existing heart condition requires the use of antibiotics before dental procedure. Additional studies have pointed out to a relationship between periodontal disease and stroke. In one study that looked out the cause relationship of oral infection as a risk factor for stroke, people diagnosed with acute cerebrovascular ischemia were found more likely to have an oral infection when compared to those in the control group.

**BASIC PERIODONTAL ANATOMY**

Teeth are supported by a connective tissue attachment apparatus (periodontal ligament) that is partly inserted into the outer layer of the root surface (root cementum) and partly into bone that surrounds the teeth. Teeth and gingival epithelium that surround teeth form several different ecological environments, each suitable for colonization by a distinct group of microorganism. The gingival sulcus is a niche that is readily colonized by oral bacteria that form a biofilm, or dental plaque.

**PATHOPHYSIOLOGY**

Three clinical parameters are typically recorded in epidemiological studies of Parkinson’s disease (PD) to assess prevalence: (1) Bleeding on probing which reflects the presence of an inflammatory infiltrate in gingival tissue, (2) Pocket depth which describes the deepening of gingival sulcus from which dental plaque biofilm can propagate, and (3) Clinical attachment level, which reflects the amount of periodontal tissue loss. Bleeding on probing and increased pocket depth indicates current pathology, whereas attachment levels provide a cumulative measure of loss of support caused by aggregate effects of pathogenetic factors such as PD and trauma.

Markers of periodontitis include evaluation of subgingival microbial colonization by selected periodontal organism and level of serum immunoglobulin (Ig)G and IgA antibodies to selected periodontal bacteria. In some cases, high titers likely suggest the presence of a protective adaptive response, whereas, in others, they reflect the severity of periodontitis.

**MICROBIOLOGY OF PD**

A newly cleaned surface of the tooth is rapidly covered with a glycoprotein deposit referred as a pellicle. The microbial composition of dental plaque differs above and below the gingival margin. Factors that influence the distinct pattern of microflora include specific local surface receptors for bacterial adherence. In the presence of gingivitis, Gram-negative anaerobic bacilli predominate in the subgingival flora. Subgingival microflora in gingivitis represents a transition between that associated with health and periodontitis.

Initial (primary) supragingival colonizers have particularly affinity for constituents of pellicle. These colonizers include Streptococcus sanguis, Streptococcus oralis, Streptococcus mutans, Actinomyces naeslundii, and Actinomyces odontolyticus. The primary colonizer is followed by adherence of secondary colonizers such as Fusobacterium nucleatum, which in turn coaggregate with later colonizers. Within a short time complex communities of Gram-positive and Gram-negative bacilli and cocci become embedded in an extracellular matrix.

**RISK FACTORS FOR PD AND CVD**

Risk factor associated with the development of PD includes local, systemic, and genetic factors. Although several bacterial species are currently recognized as casually associated with periodontitis, mere colonization of the
gingival niche by these species is not sufficient for disease to occur. Instead PD is thought to be evolved from the stage of gingivitis, a local inflammatory process without loss of periodontal tissue support, that likely represent a stable, largely protective host response to periodontitis, a condition characterized by loss of connective tissue attachment and alveolar bone, influenced by environmental exposures and specific genetic predisposition.

Contributors to ASVD are similarly multifactorial and include a complex interplay between genetic, environment and lifestyle factors. Many prevalent risk factor with well-documented impact are shared by ASVD and PD and could confound a relationship between increasing age, smoking, alcohol abuse, race/ethnicity, education and socioeconomic status, male sex, diabetes mellitus, and overweight are all factors associated with both ASVD and PD. Although smoking is a major risk factor for both periodontal and CVD recent evidence seems to indicate that the observed association between PD and ASVD may be independent of smoking. It has been shown both in cross-sectional and in longitudinal studies,17 that PD and ASVD are associated in never smoker as well.

**PATHOGENIC MECHANISM PROPOSED AS LINKS BETWEEN CVD AND PD**

There are several pathways which have been proposed as a potential link between CVS and PD.

**Indirect Mechanisms: Systemic Inflammation**

Atherosclerosis may begin during childhood with initial infiltration of the endothelium with fatty substances and progress over many decades. Plaques that contain a soft atheromatous core are unstable, and their rupture will expose highly thrombogenic contents to blood, with activation of thrombosis and ensuring ACS, MI or stroke.18

The link between ASVD and inflammatory mediators in blood is well-established, with consistent associations between levels of systemic inflammatory markers and increases in clinical events, such as MI and nonhemorrhagic stroke, and in surrogate markers such as increased cIMT.19

A well-studied inflammatory marker is CRP. Many studies of individuals with no prior history of ASVD have demonstrated that a single nonfasting measure of CRP is a predictor of future vascular events, including MI, stroke, peripheral arterial disease, and sudden cardiac death.20

Additional inflammatory markers associated with CVD include lipoprotein-associated phospholipase A221 and tissue inhibitor of matrix metalloproteinase,22 myeloperoxidase, and fibrinogen.

Periodontal inflammation is associated with systemic markers such as CRP, tumor necrosis factor alpha, IL-1, IL-6, and IL-8.23 Systemic inflammation is similarly associated with cellular activation that involves cellular adhesion molecules, toll-like receptors, matrix metalloproteinase, and nuclear factor-k beta activation. The resulting interplay between endothelium, monocytes and platelets might be proatherogenic,24 contributing indirectly to atherogenesis or adverse cardiovascular outcome related to atheromatous plaque rupture in a subject with periodontitis.25

**Indirect Mechanism: Mimicry**

Molecular mimicry is thought to occur when sequence similarities between foreign and self-peptides produce cross-activation of autoreactive T or B cells that can lead to tissue pathology or autoimmunity.26

Expression of host protective heat shock proteins (HSPs) such as HSP60 on endothelial cells may be induced by a variety of factors, including cytokines and shear stress and antibodies to HSP60, which have been associated with higher morbidity and mortality from atherosclerotic ASVD.27 Proponents of molecular mimicry as a link between PD and ASVD suggest that endothelial damage may be aggravated by an immune response to bacterial HSP, such as molecular chaperone GroEL present in *P. gingivalis* and other periodontopathic bacteria.28

**Direct Mechanism: Bacteremia and Vascular Infection by Periodontal Pathogens**

Bacteremia that originates from the oral cavity is a common event that can occur during chewing and tooth brushing. It potentially occurs multiple times per day in individuals with some degree of gingivitis and periodontitis.29

A comprehensive search of literature provides a list of more than 275 bacterial species that have been identified in blood cultures after routine daily events or dental procedures.30 Viridans group streptococci represent a significant proportion of flora around teeth, particularly in the dental biofilm that grows about the gingival crest. From there periodontal organism circulates in the blood stream either within phagocytic cells or extracellularly and subsequently are deposited in an atheromatous plaque. Common PD pathogens including *P. gingivalis* adhere to and invade various human vascular cells in culture.31

Numerous studies have examined the effect of antimicrobial antibiotic therapy on outcomes in patients with coronary artery disease. Of note systemic antibiotics alone would not be expected to lead a long-term resolution of chronic
periodontitis, in which bacteria resides in a biofilm. One study found that antibiotic use was associated with reduced cardiovascular events but did not improve mortality.32

Observational Studies using Noninvasive Imaging/surrogate Markers of ASVD
A systematic review on the use of broad spectrum of such methods in patients with PD included screening computed tomography of coronary arteries, ultrasound of the carotid arteries, magnetic resonance imaging, microalbuminuria and other biochemical measures of kidney dysfunction, and flow-mediated vasodilation (FMD) of the brachial artery. These methods have proved useful in clinical investigations of specific ASVD manifestation in defined patients cohorts and have been applied to the question of a possible PD/ASVD link.

Association Periodontitis with Subclinical Carotid or Coronary Artery Disease
Increased cIMT has correlated with PD in several association studies, which demonstrated that severe periodontitis, high subgingival colonization concentrations by specific periodontal pathogen, and high serum IgG titers against individuals periodontal bacteria were significantly related to increase cIMT in adjusted analyses.

Detection of coronary artery calcium (CAC) by computed tomography has been promoted as a marker of risk for future ASVD events. The 2007 ACC/American Heart Association (AHA) expert consensus statement on CAC scoring by computed tomography judged that it may be reasonable to use CAC measurement in asymptomatic patient with intermediate CHD risk (between 10% and 20%, 10 years risk of estimated coronary events) on the basis of available evidence that demonstrates incremental risk prediction information in this selected patient group.35

Association of Periodontitis with Endothelial Dysfunction
Endothelial dysfunction may be the earliest vascular manifestation of ASVD and has been associated with traditional risk factors for ASVD including systemic inflammation, obesity, and physical inactivity among others.34 Smoking cessation, use of statin therapy and angiotensin converting enzyme inhibitors, improved endothelial function in clinical trials. A number of tools are used to asses endothelial function in vivo. More recently noninvasive methods such as high resolution ultrasound assessment of the brachial artery after FMD or nitroglycerine administration and digital pulse amplitude tonometry have been studied across a broad spectrum of patients populations.35

Periodontal Intervention and ASVD Risk
Periodontal therapy consists of mechanical debridement of root surfaces accompanied by home based plaque control (tooth brushing and flossing) whether or not the treatment of PD modifies the risk for or complications of ASVD has yet to be established. The most recent available systemic review of 6 treatment studies investigating the effects of periodontal therapy or serum CRP levels concluded that there is modest evidence of a treatment-induced reduction in CRP.38

Existing evidence does not prove that treating periodontitis will prevent CVD. However, periodontitis causes inflammation inside the mouth and evidence shows that inflammation inside the body can help us ascertain how healthy the heart and blood vessels are, even in the early stages of CVS.39 Several studies and randomized clinical trials have reported improvement of endothelial function and associated markers of inflammation among subjects with significant PD who have undergone nonsurgical periodontal therapy with or without systemic antibiotic.40

Recently a randomized controlled trial involving full mouth mechanical debridement by either surgical or nonsurgical approach, dictated by the patient’s condition, completed within a single session and accompanied by the extensive application of local antibiotics in all deep periodontal pockets demonstrated a significant improvement in brachial artery FMD at a 6-month follow-up examination.41

A review of intervention studies that investigated the effect of periodontal therapy on plasma levels of inflammatory mediators revealed inconsistent findings. Patient treated by nonsurgical periodontal therapy displayed a significant increase in plasma tumor necrosis factor alpha, CRP, and IL-6 levels immediately after intervention, which suggests a systemic acute phase response, possibly caused
by massive bacterial inoculation in conjunction with the instrumentation of periodontal tissue.\textsuperscript{42}

To date, only a single multicenter pilot study has examined the effects of periodontal therapy on the secondary prevention of cardiac events. The periodontitis and vascular events periodontitis and vascular events investigation.\textsuperscript{43} Randomized patients with periodontitis and a history of CHD (angiographically proven coronary artery disease of recent MI or surgical or percutaneous coronary revascularization) to either community care (generally consisting of supragingival debridement only, control group) or a study protocol that consisted of oral hygiene instruction and nonsurgical periodontal therapy. Over a 25 months follow-up period, adverse cardiovascular events occurred with similar frequency in the community and the periodontal treatment group.

**CONCLUSION**

It is now clear from the epidemiologic studies that a potential link exists between PD and CVD oral health care. Professionals can identify patients who are unaware of their risk of developing serious complications as a result of CVD and who are in need of CVD and those who need medical intervention.

Prospective interventional studies are required to determine the exact link between PD and CVD as well as to evaluate whether periodontal treatment may reduce the risk of developing CVD. However, the challenge remains whether PD can be considered one among the traditional risk factor for CVD as the link established from different studies is not limited to a recent CVD. PD Seems to be associated with no more than a modest increase (−20%) in cardiovascular risk in general population.

As the ongoing studies report and confirm the strength of the association between PD and CVD in the next two decades, the oral health-care professionals and medical professionals have to prepare for better planning of prevention programs. It seems from the scientific evidence gathered so far that interventional care remains invaluable not only for oral health but also general health as well.

We conclude that the current evidence supports the notion that the incidence of ACVD, as represented by incident CHD, cerebrovascular disease, and peripheral arterial disease is higher in subjects with PD and/or worse periodontal status, compared to subjects without PD or with better periodontal status, independent of many cardiovascular risk factors. However, this may not be the case in all groups of the population.

Periodontitis could bear a significant CVD risk since it is a long-term disease process with a high prevalence in the Western population and may not always respond to treatment. Observations that the risk is highest in individuals with periodontitis and elevated CRP concentration and serum antibody levels to periodontal pathogens may suggest that periodontitis increases CVD risk mostly in individuals who react to this infection by a systemic inflammatory and immune response.

The relation between PD and ASVD is potentially of great public health importance because of their high prevalence extensive review of literature indicates that PD is associated with ASVD independent of known confounders. This information comes mostly from observational studies, however, and therefore does not demonstrate that PD is a cause of ASVD, nor does it confirm the contention that therapeutic periodontal intervention prevents heart disease or stroke or modify the course of ASVD. Although a contribution of PD to ASVD is biologically possible, periodontal and CVD share multiple risk factors that are prevalent and powerful promoters of disease, including tobacco use, diabetes mellitus, and age.

Recommended periodontal treatment solely for the purpose of atherosclerosis CVD prevention is not warranted based on current scientific evidence. Periodontal treatment must be recommended on the basis of the value of its benefits for the oral health of patient recognizing that patients are not healthy without good oral health and taking into account AHA recommendations. However, the emergence of periodontal infections as a possible risk factor for CVD is leading to a convergence in oral and medical care. As dental, public health and medical researchers and practitioners reach across disciplines, a holistic approach to care only benefit the patients and public health as a whole.

**REFERENCES**

4. Torres DF. Evaluation of plasma fibrinogen in patients with periodontal disease at the Naval Medical Centre Surgeon Major Santiago Távara in the year; 2013.
6. Loos BG, Craandijk J, Hoek FJ, Wertheim-van Dillen PM, van der Velden U. Elevation of systemic markers related to cardiovascular diseases in the
Minimally Invasive Endodontics a Promising Future Concept: A Review Article

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Abstract

The primary aim of endodontic therapy is the long-term retention of a functional tooth by preventing or treating apical periodontitis. However, the outcome of the endodontic treatment is multifactorial such as the quality of the restoration and structural integrity of the tooth after root canal preparation. Dentists need to reassess and recalibrate the endodontic and restorative techniques to best suit the way that they practice today. At the same time, need to preserve essential tooth structure to routinely achieve a 50-year, not a 5-year, successful outcome. Contemporary research efforts are currently directed to better understanding dentin behavior and structure during aging and function. An alternative approach is to minimize structural changes during root canal therapy, which may result in a new strategy that can be labeled “minimally invasive endodontics (MIE).” MIE is desirable in the interest of the patient, and preserving tooth structure requires optical magnification aids (surgical microscope), ultrasonic-assisted preparation techniques, modern file systems, and in-depth knowledge of the tooth and root canal anatomy.

Key words: Concept, Minimally invasive endodontics, Principles, Various aspects of new concept

INTRODUCTION

The goals of successful endodontic treatments are to eliminate all organic substrates from the complex root canal system, and filling the root canal system. In the context of current endodontic development, for proper cleaning and shaping, for promoting the long-term health of supporting structure of a tooth well shape canal is needed.

Minimally invasive endodontics (MIE) is a concept of maximum preserve the healthy coronal, cervical and radicular tooth structure during the endodontic treatment. For success, the dentist must aware between conservation and elimination of tooth structure during endodontic procedure to fulfill the endodontic goals.

Dr. Herb Schilder, in 1974, precisely described the mechanical objectives for the preparation of a canal that, when filled, would ensure the biological goals for long-term success. However, these objectives were published way before any proposal of the most contemporary concepts of minimally invasive dentistry and, more recently, MIE.

Predictability of success in endodontics is currently lye on preparing the access cavity, shaping, cleaning, and filling root canal systems. Going forward, the question that should be scientifically answered is, how conservatively can be prepared any given access cavity or root canal, and most importantly - still enable the root canal system to be both 3D cleaned and filled? Until, this question is answered by collaborative research, it would be better to continue to practice utilizing the most proven treatment concepts and techniques. There is an old saying, “Model success. Success leaves clues.” Long-term endodontic treatment success must integrate respect for the concept of MIE while fulfilling treatment objectives by mechanically and biologically.

MIE refers to the minimally removal of dentin during the all three phases of a root canal procedure: (1) Coronal access preparation; (2) radicular apical preparation; and (3) flaring of the canal that connects the coronal to the apical preparations. To achieve these dental surgeons must develop new skills and dexterity.
to adapt a limited working environment during treating endodontic disease. These skills include working with new instruments, irrigants for cleaning and shaping the canal system and applying newer materials that increase the prognosis for restoring structure and retaining the natural dentition. Utilizing advanced imaging modalities and computer software for understanding the complexities of the root canal system, employing increased magnification, and lighting for visualizing the pulpal space.

However, currently, there are no developed protocols for MIE. The aim of this review is to illustrate the current status of non-surgical endodontic procedures and highlighting the conservation of tooth structure to enhance longevity after root canal treatment.

**PRESERVING STRUCTURAL INTEGRITY**

The remaining structural integrity of the tooth plays the key factor that determines prognosis as it relates to the future function of the tooth after restoration (Figure 1). The goal of all restorative procedures is to the future function of the tooth after restoration the key factor that determines prognosis as it relates to the natural dentition. Highlighting the conservation of tooth structure to enhance the prognosis for restoring structure and retaining the pulpal space.

Reeh et al., in 1989, did a study to assess the stiffness of cusps when comparing conventional cavity preparations to endodontic access openings on bicuspid teeth. It was found that endodontic access openings by itself have only a small (5%) impact on tooth stiffness as opposed to any restorative preparation that removes the tooth’s marginal ridges reducing cuspal stiffness by 63%, for example, a MOD preparation. The study identified that with each prepared surface approximately a 20% loss of tooth strength occurs. Marginal ridges are a key factor in retaining tooth strength as per above studies.

There is a widely held clinical perception that endodontically treated teeth are more brittle and hence more likely to fracture. A study on animal that shows moisture loss of 9% after root canal treatment in dog’s teeth gave support to this hypothesis. However, there are currently a number of studies in human teeth showing that the dentin properties of endodontically treated teeth do not differ in any meaningful way from vital dentin. Hence, the predominant reason that endodontically treated teeth are more prone to fracture due to the structural loss. Collectively, these studies show minimum dehydration effects due to pulpal removal and demonstrate biomechanical behaviors in strength and toughness testing that are similar to vital dentin.

Recently, researchers have shown that the cause of fracture is multifactorial; loss of structure is not the only reason. Factors which can cause the dentinal fatigue resulting cracks are chemical factors such as irrigants and medicaments on dentin; the bacterial effect on the matrix of dentin; structural loss due to the effect of post and core restorations and the results of age changes in dentin. There is up to 50% reduction in the tensile and fatigue strength of coronal dentin in seniors (over 55 years) when compared to that of young adults. The resistance to propagation of fatigue cracks in dentin decreases with increasing patient age, and the incremental rate of crack extension is up to 100 times greater in seniors.

**Importance of Dentin**

Enamel is essentially a crystalline structure and is therefore naturally supported 100% by dentin. By contrast, dentin is a multilevel composite that can stand alone and acts ideally as a semi-rigid pipe.

When endodontically treated teeth fail under function, that outcome is determined primarily by two etiologies: (1) Degree of stress experienced by the tooth under load and (2) inherent biomechanical properties of the remaining structure responsible for resisting fracture. Among technical elements of root canal therapy, access preparation and post-preparation are most relevant in causing the tooth more susceptible to significant destabilisation. Biological success (i.e., no periradicular disease) and survivability of the tooth there are three essential aspects of clinical endodontics:

- Biological success is achieved by prevention or removal of the apical 3 mm to 4 mm of the canal microbes.
- With the minimal removal of original tissue in the coronal two-thirds of the root long-term survivability of the tooth is improved.
- Access to the root canal (both coronal and apical) is critical.

Unfortunately, only a few of long-term controlled clinical studies are available for understanding the relationship
between restoration, especially with posts, tooth fracture and the biomechanical behavior of restored dentin (Figure 2). The mechanical demands of human mastication create an endless number of impacting variables, and only those long-term clinical outcomes remain the gold standard for evidence.

Evidence are there that not only in endodontically treated tooth but also in normal tooth fracture can occur under physical loads. Chan et al. (1998) stated that all teeth, especially molars, can fracture without any endodontic treatment. When a fracture occurs in both the periodontal attachment and the bone adjacent to the fracture will affect. Once a fracture begins in the root, it leads to an accumulation of bacteria, food debris, cements, necrotic tissue which causes inflammation of a reactive periodontium. Yeh et al. suggested heavy masticatory forces as a cause for root fracture. Root fractures seem to be more prevalent in seniors and male populations; preexisting attrition is often a component of the condition.

MINIMALLY INVASIVE ACCESS PREPARATION

The priority of effective endodontic therapy is to access, shape and clean the complex system in such a manner that will allow efficient and total filling of the root canal space while leaving the tooth with maximum strength to function successfully. The mechanical objective of access preparation is to physically penetrate, funnel, and unroof the pulp chamber. The biological and mechanical objective of access preparation and concept of MIE should coexist. Hence, the access preparation should not be too small or big. Too small access obstructs the view of the operator, and too big preparation un-necessary remove the vital tooth structure (Figure 3). In this era of enhanced lighting and magnification, as well as highly flexible rotary instruments, help to achieve the objective of access preparation with MIE concept.

Recently, maintaining the structural integrity of the pericervical area of the tooth (about four mm above and below the alveolar crest) has been emphasized (Figure 4).

Especially in molars of pericervical dentin (PCD) plays a critical role in the maintenance of their long term survivability and optimum function. The philosophy of minimal invasion is now discouraging the use of round burs and Gates-Glidden burs as these instruments commonly gouge the endodontic access and the coronal third of the root canal, especially around the PCD (Figure 4). Gouging of the access and coronal canal space must be avoided in order to preserve maximal resistance to structural flexure and ultimate failure. The key is banking of tooth structure and is age- and case-sensitive. For example, in the case of the importance of pericervical enamel, in the physiologically young molar, the cementoenamel junction (CEJ) is an invaluable asset. More caries resistant are seen when margins of direct and indirect restorations placed on enamel than on dentin. For transition, the stress from crown to apex the CEJ is the most ideal vehicle. The practitioner ensures a more
SHAPING THE ROOT CANAL SPACE

Root canals are sometimes depicted as smooth hollow tubes that are more or less tapered in shape. However, in reality, they are often asymmetrical or oval in cross-section, they branch, dilacerate and divide and the canal walls show concavities and convexities.11 Basically, it is a complex anatomical system. The goal of biomechanical instrumentation, the completed root canal shapes need to withstand the internal compressive forces of obturation; provide sufficient resistance form to contain softened and compressible filling materials and retain enough strength for mastication.

The big, aggressive canal-flaring concept is officially over. Endodontic design should be biomimetic and extremely conservative as: (1) the tooth will be stronger and (2) there is insufficient evidence that big shapes provide a better seal and thus fewer endodontic failures.6,7

In a series of morphometric measurements on anterior and posterior teeth, Kerekes and Tronstad et al. in 1977, found a wide range of measurements at the apical constriction of all teeth. The true horizontal diameters are necessary to clean the terminus of root canal, Jou et al.12 coined the term “working width” which is the critical need to understand the horizontal dimension of apical size and its clinical implication in cleaning the apical terminus. This creates two separate philosophies for practitioners, each focused on its own set of evidence-based protocols supporting a position on how to clean these apical diameters and ultimately shape the root.

Nowadays, there are two general trends in contemporary endodontic practice amongst the clinicians. Enhanced apical instrumentation and larger apical diameters with a minimal taper in the canal shape leads to weakening of the root structure as there is loss of apical dentin and a loss of control over the obturation component of treatment. Hence, now a number of practitioners advocate smaller apical preparations, continuous taper, and a preparation. This kind of preparation promotes resistance form, a tight apical seal and a conservative approach to creating sufficient shape for adequate disinfection. Smaller apical sizes preserve root dentin. This kind of arguments is strategy and technique-driven, often supported by several student outcomes. The impetus for smaller apical sizes has been directed at the disinfection and obturation phase of endodontic therapy.13-15

On the other side, there is a significant number of literature presents in support of larger apical canal diameters are important to shape the apical canal wall, flush debris, allow deeper irrigation to the terminus and decrease remaining bacterial contamination in the system.16-18 Studies vary on which size diameter will accomplish maximum cleaning. New researches have shown that minimal sizes can accomplish this task of elimination of bacteria as adequately as larger diameters.19,20 It is clear from the evidence is that it is not possible that any apical preparation technique will render the terminus entirely free of bacterial contamination in an infected canal by the using of any schools of thought. Structural considerations in biomechanical preparation are very important and arguable.

Weine et al.21 and others have described and elucidated the structural damage and preparation errors such as transportation, ledging, apical perforation, and loss of the original canal position that can occur while shaping root canals with stainless steel instruments to large sizes. These shaping errors often lead to loss of working length and damage to the apical terminus leading to weakening of the root structure at its most fragile levels.

The use of super-elastic rotary and nickel-titanium instruments offers less straightening and better-centered preparations compared to traditional stainless steel instruments in preparing the wide range of anatomical variability seen in teeth (Figure 5).22,23

CONSIDERATIONS IN MIE

The microbiologic etiology of endodontic disease is a key element of the overall treatment strategy. To achieve disinfection in any minimally invasive approach is a challenge. However, in vitro microbiological studies do not provide a definitive answer of required preparation size for antimicrobial efficacy. A large clinical data set does not support any association between apical healing or retention of a root canal-treated tooth with particular canal shape.24

Current cleaning and shaping methods appear to be failed to remove all bio-burden from the root canal system. Therefore, search for techniques to enhance irrigation efficacy continues. The possibilities for physical means that enable enhanced disinfection vary from sonic or ultrasonic or other activation up to and including laser activation.25,26

An in vitro study by Krishan et al. using a combined microcomputed tomography and load-to-failure approach.27
Found that with minimal access cavity designed premolars shaping was not impacted, and load to failure was significantly higher for teeth. Till now as all the model of MIE access preparations are in vitro, so studies needed for the clinical implication of such preparation.

In current years, several investigations have illustrated microcracks in extracted teeth induced by various rotary shaping procedures in preparation of canal. However, it is not clear that if such cracks are generated in vivo. It may be reasonable to lessen additional loads on a structurally weakened root by developing instruments that reduce vibration and rotational stresses during intracanal procedures. Micro-computed tomography studies showed that due to compacted hard tissue debris into unshaped canal make them potentially inaccessible to irrigation. As the idea of MIE has been recently promoted, there is a scarcity of independent evaluations for such a strategy. It is likely future root canal preparation techniques will have to focus on balancing disinfection capacity and iatrogenic damage with enhanced debridement and disinfection.

RESTORATION STRATEGIES FOR MAXIMUM PROTECTION AND MINIMAL INVASION

A successful endo treatment needs a good post-endo restoration. Reviews of evidence surrounding the restoration of endodontically treated teeth, preservation of intact coronal and radicular tooth structure, especially maintaining the pericervical structure for allowing a substantial “ferrule effect,” is considered to be crucial for the optimal biomechanical behavior of restored teeth. The presence of a 1.5-2 mm ferrule has a positive effect on fracture resistance of endodontically treated teeth.

Restorative materials should almost always be sacrificed before tooth structure. Teeth with a ferrule of one mm of vertical tooth structure doubled the resistance to fracture when compared with teeth restored without a ferrule. Even an incomplete ferrule is considered a better option than a complete lack of ferrule if the clinical situation does not permit a circumferential ferrule. It concluded that an adequate ferrule is required for the long-term of an endodontically treated tooth.

Severely damaged teeth with little or no coronal structure, to provide space for a ferrule, should consider orthodontic extrusion rather than surgical crown lengthening. More tooth structure has been preserved by this approach and ensures a more favorable biomechanical behavior of remaining dentin structures.

Final cavosurface outline extension at the finish appointment hinges on the existing restorative, and the restorative plan. If abundant highly bondable substrate like etchable porcelain or enamel is available, and a bondable restorative material such as a composite resin is planned, the cavosurface should be Cala Lillied (Figure 6), or properly beveled on those areas. If the bondability of the substrate is of low, or a bond cannot be established between the substrate and restorative material, a butt joint or 70-90° interface at the cavosurface should be the objective. On multiple visit cases in which an unbonded temporary restoration is placed, the cavosurface should be maintained at 70-90° until the completion visit.

The nominal use of posts in endodontically treated teeth support minimally invasive therapy. In the past decade, use of post discouraged due to unnecessary loss of root dentine. Based on the evidence, it is clear that the retaining tooth structure is more valuable than the use of a post. The long-term success of endodontic treatment has always been dependent on the restorative treatment. A restored tooth should be structurally sound, and the sealed state of the root canal system should be maintained. Most of
the endodontically treated teeth today are restored with adhesive materials.

Conventional thought has been that posts do not “reinforce” the root. Early restorative protocols considered this true for metal posts, but there are now growing evidence that bonded fiber posts can be placed with no removal of dentin structure, may protect the root and make it more resistant to fracture. Fiber-reinforced resin posts were introduced to provide more elastic support to the core. The reduced stress transfer to tooth structure lowered the root fracture. In addition, posts made of materials with a modulus of elasticity similar to dentin were considered more resilient; able to absorb similar impact forces and distribute the forces of mastication in a more protective manner to remaining dentin than stiffer metallic posts.34 It may be premature to describe adhesive technology as “reinforcing” or “root strengthening” but in terms of distributing forces throughout the remaining dentin structure it may certainly be deemed “protective.”

CONCLUSION

The loss of a tooth in spite of successful endodontic therapy can invariably be attributed to one or more predictable explanation. Often these sequelae can clinically avoidable and the result of an approach to therapy that is far more invasive than required to cure the causes of apical periodontitis. These outcomes include.18

Poor access cavity design and execution:
• Iatrogenic or procedural mishap weakening pericervical integrity
• Instrumentation errors such as ledging, perforation, transportation from center
• Recontamination due to coronal leakage of the pulpal space
• Crown and root fracture.

As practitioners of dentistry, poor outcomes in the course of endodontic treatment should encourage reflection on the careful practice of endodontics that safeguards against undesired events. Our responsibility as experts is to protect patients from iatrogenic harm. This responsibility is fulfilled when we as a professional can give advanced and sophisticated therapies in a controlled and safe manner with preservation of the tooth as an overriding priority in all aspects of our treatments.

MIE are in the interest of the patient, and preserving tooth structure requires optical magnification aids (surgical microscope), ultrasonic-assisted preparation techniques, modern file systems, and in-depth knowledge of the tooth and root canal anatomy. However, as yet there is no clear evidence concerning the impact of MIE on the success rate.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Successful Outcome of Pregnancy in β-thalassemia Major Individual

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Abstract

Thalassemia major also called as Cooley’s anemia, it has a codominant inheritance and pathology lies in decreased synthesis of beta chains resulting in increased production of alpha chains, which subsequently leads to red cell destructions, ineffective erythropoiesis, and anemia. A 23-year-old primigravida, married life 1 year (height 158 cm, weight 61 kg) with thalassemia major presented in the antenatal care outpatient department at Santokba Durlabhji Memorial Hospital with 6 weeks gestation. The patient had severe form β⁰/β⁺ thalassemia major, and her thalassemia was identified at the age of 2 years. Both parents were thalassemia trait, and her sibling had normal hemoglobin pattern. Her antenatal period was managed well, with blood transfusion almost every week. She presented to labor room with 35+6 weeks of gestation in labor at 11 pm and not willing for normal delivery therefore under general anesthesia cesarean section was done and an alive female baby with birth weight 2.6 kg was delivered at 11:50 pm with Apgar 8 at 1 min and 10 at 5 min. Surgery was uneventful, and blood loss was minimal. This case report aims to highlight important issues associated with pregnancy in β-thalassemia major patient and obstetric management.

Key words: Blood transfusion, Chelation therapy, Gestation, Hemoglobin

INTRODUCTION

The β-thalassemias are distributed widely across the Indian sub-continent, Mediterranean region and throughout the Southeast Asia, and can also occur sporadically in many ethnic groups. According to statistics, 45% of the world population is affected by thalassemia; out of this population, in India, 3.5% are carriers of thalassemia. β-thalassemia minor does not influence the pregnancy outcome in the negative way significantly.¹

Since late 1970s, the pediatric and hematological management of patients with β-thalassemia major has improved significantly due to advances in medical care, ready availability and experience in extensive blood transfusions and iron chelation therapy. However, complications such as pulmonary hypertension, thromboembolic complications, overwhelming postsplenectomy sepsis, and the development of hepatocarcinoma may reduce survival in this group of patients.² Even with these medical advances a case of β-thalassemia major carrying a pregnancy to term and with a pregnancy to term and with a successful outcome is rarity.

According to the recent discoveries of psychoneuro endocrinology showing the relation between biological function mediated by the immune system and psychological status, therefore evaluation of the psychological life will have to be included within the regular clinical investigations on thalassemic pregnant women.³

CASE REPORT

A 23-year-old primigravida, married life 1 year (height 158 cm, weight 61 kg) with thalassemia major presented in antenatal care (ANC) outpatient department at
Santokba Durlabhji Memorial Hospital with 6 weeks gestation. The patient had severe form $\beta^0/\beta^+$ thalassemia major, and her thalassemia was identified at the age of 2 years. Both parents were thalassemia trait, and her sibling had normal hemoglobin pattern. The patient had received lifelong blood transfusions along with chelation therapy regularly since 2 years of age at Santokba Durlabhji Memorial Hospital. Her developmental milestones had been normal, with menarche at the age of 12 years followed by regular menstrual periods. Pregnancy was spontaneously conceived, her partner had a normal hemoglobin pattern, and therefore fetus was not subjected for prenatal diagnosis for thalassemia. The patient had normal thyroid function pre-pregnancy but her thyroid-stimulating hormone (TSH) in the first trimester was 5.83, therefore, she was put on tablet Eltroxin 50 µg OD, on this her TSH was <2 in next trimesters. Other ANC checkups were normal. Her nuchal translucency scan, double marker, and congenital anomaly scan were normal. Before pregnancy, she had a blood transfusion at every 14th or 15th day to maintain hemoglobin at 10 g/dl, in pregnancy she had transfusion weekly. In her second trimester at 24+3 weeks, she was admitted for 3 days in view of high-grade fever with hemoglobin 8.6 g/dl, which was later diagnosed as malaria, managed accordingly.

There was evidence of thalassemic facies and hepatosplenomegaly with spleen measuring about 22.6 cm with dilated splenic veins about 11.9 mm and enlarged liver with coarse echocardiography (ECHO) texture. As soon her pregnancy was confirmed, her cardiac function was assessed by ECHO which was normal. Her lifelong care had been managed by pediatric specialist at our center. Her ANC was jointly managed by obstetric and pediatric hematological departments at our institution. The chelation therapy, desferrioxamine, was stopped when pregnancy had been confirmed due to the risk of teratogenicity and fetal iron deficiency in late pregnancy and restarted 1 month after delivery.

At 34 weeks gestation, repeat reference done with a cardiologist and cardiac evaluation done which was within normal limit and prophylactic steroids given to her for fetal lung maturity. She presented to labor room with 35+6 weeks of gestation in labor at 11 pm and not willing for normal delivery therefore under general anesthesia cesarean section was done and an alive female baby with birth weight 2.6 kg was delivered at 11:50 pm with Apgar 8 at 1 min and 10 at 5 min. Surgery was uneventful, and blood loss was minimal.

The post-operative period was uneventful. Her post-operative hemoglobin was 9.7 g/dl, and there were no postpartum complications, and both mother and baby were discharged after 3 days. She started her routine follow-up with pediatric hematologist post-delivery. Iron-chelating therapy was restarted after 1 month, and routine hematological and cardiovascular review was done.

DISCUSSION

Thalassemia major also called as Cooley’s anemia, it has a codominant inheritance and pathology lies in decreased synthesis of beta chains resulting in increased production of alpha chains, which subsequently leads to red cell destructions, ineffective erythropoiesis, and anemia. Since repeated blood transfusions are required in thalassemia major, there is iron overload which in turn causes deposition of iron in the hypothalamus and the pituitary causing reproductive axis failure leading to delayed puberty, delayed sexual development, and infertility.

Improvements in managing $\beta$-thalassemia major have allowed many patients to survive beyond puberty. Fertility can be impaired as a result of iron overload related hypogonadism, although assisted reproductive
techniques and advances in treating iron overload have increased the number of successful pregnancies in such patients.

CONCLUSION

This case report aims to highlight important issues associated with pregnancy in β-thalassemia major patient and obstetric management. Our patient had a successful cesarean delivery under general anesthesia as a result of careful monitoring and treatment of her condition antenatally and closes multidisciplinary approach to ensure optimal management of her pregnancy.

REFERENCES

Superior and Inferior Lens Subluxation in a Patient of Marfan Syndrome: A Rare Case Presentation

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Abstract

Marfan syndrome (MFS) is a spectrum of disorders caused by a heritable genetic defect of connective tissue involving the musculoskeletal, cardiac, and ocular system predominately. The defect itself has been isolated to the fibrillin1 (FBN1) gene on chromosome 15, which codes for the connective tissue protein FBN. Aortic root dilatation and ectopia lentis are the cardinal clinical features. In the absence of family history, the presence of these two manifestations is sufficient for confirmatory diagnosis of MFS. There’s no cure for MFS, so treatment focuses on managing the symptoms and reducing the risk of complications. Recent advances in diagnosis, improved surgical technique and application of prophylaxis has contributed in the preservation of sight in patients.

Key words: Ectopia lentis, Marfan syndrome, Ocular manifestation

INTRODUCTION

Marfan syndrome (MFS) is the most common cause of heritable ectopia lentis, and ectopia lentis is the most frequent ocular manifestation of MFS, occurring in approximately 75% of patients.¹ MFS is an autosomal dominant disease resulting from various mutations to the fibrillin-1 (FBN-1) gene located on chromosome 15. It is thought that the increased incidence of ectopia lentis with MFS is due to altered FBN microfibrils leading to incompetent zonular fibers and structural abnormalities of the lens capsule.² Lens dislocation in MFS is usually bilateral and occurs most often in the superotemporal direction, though other directions are not uncommon.³

CASE REPORT

A 23-year-old male presented to our Ophthalmology Department on 10th March 2017 with a complaint of diminution of vision and glare. The patient was tall-statured with thin and long extremities. Ocular examination revealed visual acuity in the right eye as 6/6 (With correction of −0.50 D sphere; −3.50 cylinder 160) and left eye as 6/6 (with correction of −4.00 cylinder 180).

Ocular motility was full and free in all direction of gaze. Slit lamp biomicroscope examination of anterior segment revealed clear cornea in both eyes without any corneal ectasia and megalocornea. Both eyes angle were deep without any opposition to cornea on either side. No evidence of anisocoria and relative afferent pupillary defect. Intraocular pressure was 16 mm Hg (with non-contact tonometer) for both eyes. Dilated fundoscopy examination showed normal posterior segment without peripheral retinal degeneration or detachment. Superotemporal subluxation of the lens was noted in the right eye and inferonasal subluxation in the left eye as shown in Figure 1.

Systemic examination revealed skeletal abnormalities such as long, thin extremities, arm span greater than the height (1.06), a positive thumb and wrist sign, pectus excavatum, prominent finger joints, and high-arched palate. The patient was referred to cardiologist and echocardiography revealed mild dilatation of aortic root. The patient gave the history of the long stature of the mother and maternal uncle as well. Diagnosis of MFS was made on clinical and radiological findings.
This patient had presented to us with a complaint of decreased vision with a glare. Following refraction, the patient received visual acuity of 6/6. Patient’s family history was inconclusive. The patient was referred to a cardiologist with suspicion of MFS for further evaluation. Echocardiography finding of dilatation of aorta supported the diagnosis of MFS in the presence of definitive history. Mutation analysis of FBN1 gene helps in prompt diagnosis.\(^4\)

For ocular system involvement to be used as diagnostic criteria according to Ghent criteria, the major criterion or at least two minor criteria must be present.\(^5\)

The ocular system major criterion is ectopia lentis (lens dislocation)\(^5\) which was present in our case.

Minor ocular system criteria are as follows:
- An abnormally flat cornea
- An increased axial length of the globe, as measured by ultrasound
- A hypoplastic iris or hypoplastic ciliary muscle, causing myopia.

Ectopia lentis is usually bilateral, symmetric, supertemporal in location, and non-progressive entity present in 50-80% of the affected individual.\(^3\) It varies from mild asymptomatic displacement to significant subluxation resulting in monocular diplopia.\(^6\) Anterior dislocation of the lens results into pupillary block glaucoma or chronic angle closure glaucoma. Posterior dislocation results in posterior uveitis or chorioretinal inflammation due to leakage of lens proteins.\(^6\)

Non-surgical management includes refractive correction and application of miotic drugs.

Surgical indication for lens extraction includes lens opacity, anisometropia, non-correctable refractive error, impending total luxation of lens, and lens induced glaucoma or uveitis.\(^67\)

The presence of zonules weakness and capsular instability makes implantation of an intraocular lens (IOLs) difficult with amplification of usual complication of lens extraction. Surgical options include anterior chamber IOL, ciliary sulcus posterior chamber IOL fixed to the sclera and/or to the iris, and scleral fixated capsular tension rings. Capsular tension rings is a suitable option as it allows preservation of the capsular bag and primary implantation of IOL. It is 2700 open polymethyl methacrylate ring which causes an even distribution of centrifugal forces through the zonules. These rings contain holes that allow centering and fixation of the capsule bag to the scleral wall. Recent reports show good visual outcomes without any serious complications in surgery.\(^68\)

Our patient did not show any other ocular finding on examination. He was advised frequent follow-up with an ophthalmologist for early detection of other ocular features and follow-up with cardiologist and orthopedician was also suggested to improve the quality of life and to help early detection of life-threatening complications like dissection of the aorta.

**CONCLUSION**

Ophthalmologist has a very key role to play both in diagnosis as well as treatment of MFS. Timely diagnosis and management can help in preserving the vision and hence the quality of life.

**REFERENCES**

Hydatid Cyst in Urine: A Case Report

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Abstract

Primary renal hydatid disease without liver and lung involvement is not found very often in clinical practice and expulsion of hydatid cyst in urine is a rare entity. Three main species of *Echinococcus* are responsible for causing hydatid disease. *Echinococcus granulosus* is the most common type, whereas *Echinococcus multilocularis* and *Echinococcus oligarthrus* account for a small number of cases. Here, we are reporting a case of echinococcosis, primarily involving the right kidney, presenting with a clinical history of hydatiduria, abdominal pain and discomfort. A combination of pre-operative and post-operative albendazole therapy and surgical excision in the form of right nephrectomy was effective in alleviating the symptoms and improving the renal function.

Key words: *Echinococcus granulosus*, Hematuria, Hydatiduria, Laparoscopic surgery

INTRODUCTION

*Echinococcus*, a tapeworm causes echinococcosis also called hydatid disease or hydatidosis, a parasitic infection which is caused by the larval stage of *Echinococcus* species.¹ Three main species of *Echinococcus* are responsible for causing hydatid disease. *Echinococcus granulosus* is the most common type, whereas *Echinococcus multilocularis* and *Echinococcus oligarthrus* account for a small number of cases.¹ Dog is the definitive host of *E. granulosus*, in which the adult tapeworm is attached to the villi of the ileum. Eggs are passed and deposited within the dog’s feces. Sheep is the usual intermediate host, but humans are accidental intermediate hosts. In the human duodenum, the parasitic embryo penetrates the mucosa, allowing access to the blood stream, and enters the liver (most commonly) and the lungs.¹ Clinical features usually present late as it takes between 5 and 20 years for a cyst to become symptomatic. The most commonly affected region in the urogenital tract is kidney (2-4%), although hydatid cyst of the prostate, the seminal vesicles, and the testes have also been reported.² Renal failure is a very late complication in untreated and neglected cases.

CASE REPORT

A 35-year-old female patient was admitted in urology department with pain abdomen and abdominal lump since 3 years. The patient had a history of dull aching type of diffuse abdominal pain more on the lower abdomen with on and off burning micturition. The pain was gradual in onset and progressive in nature. The patient also gave a history of incomplete bladder evacuation with increasing frequency of micturition. The patient used to complain of temporary retention of urine and severe pain in the pelvic region during micturition with a feeling of something coming out per urethra in urine and then the relief of pain after passing of the substance. In per abdominal examination, a firm, non-tender, ballotable mass was noted in right lumbar region. The blood pressure was 134/80 mmHg in right arm supine position and pulse was 72 beats/min at the time of presentation. Various biochemical, microbiological and radiological tests were done on the patients for further management. Her hemoglobin (Hb) % was 9.8%, total leukocyte count was 9700/cu mm, random blood sugar was 113 mg/dl. Her liver function and renal test was within normal limit.

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Among viral markers, her hepatitis B surface antigen was positive as detected by enzyme-linked immunosorbent assay test, other viral markers were negative. Her blood group was A positive. Urine was taken for routine examination and culture. Ruptured hydatid cyst was seen in a urine sample with naked eye and then was examined microscopically which showed daughter cysts/brood capsules. The patient also had a computed tomography (CT) scan, intravenous and contrast of abdomen and pelvic region. CT showed large well defined thick wall complex cystic lesion of size 9.3 cm × 13.1 cm × 19 cm (AP × TRs × CC) in the right lumbar region replacing entire kidney with multiple variable size daughter cyst (largest measuring 5.2 cm × 5 cm) within along peripherally, central portion non-enhancing ISO to hyperdense content of attenuation. Focal defect of size 1.3 cm seen in the posterior wall with the complication of cyst with renal pelvis suggesting possibility of rupture of cyst in pelvicalyceal cistern, with resultant smaller cyst noted. Another cyst of size 2.3 cm × 9.1 cm × 10 cm was noted in the upper pole of right kidney. Possibility of renal hydatid cyst was considered. The patient underwent right nephrectomy, and cystic mass was sent for histopathological examination. Macroscopical examination of the surgical specimen revealed multiple daughter cysts, and the histopathological examination confirmed the diagnosis of a hydatid cyst (Figure 1). With one unit of blood transfusion done, post-operative period was uneventful. The patient was stable at the time of discharge and went home on oral medications.

**DISCUSSION**

Human hydatid cyst or cystic echinococcosis is a global health problem worldwide, having variable geographical distribution particularly in the sheep-rearing regions of Australia, South America, North Africa, Russia, and China. In developing countries like India, hydatid cyst is an emerging disease with incidences being reported throughout the country. In the small intestine (proximal small bowel), adult worm of *E. granulosus* lives attached with the help of hooklets to the mucosa. It releases eggs into the host's intestine and excreted in the feces. Human may become intermediate host through contact with a definitive host (usually a domesticated dog) or ingestion of contaminated water or vegetables. When embryo passes through the intestinal wall to reach the portal venous system or lymphatic system, the liver acts as the first line of defense and is, therefore, the most frequently involved organ. Liver accounts for approximately 75% of cases of hydatid disease in humans and lung accounts for 15% of cases. Bloodborne dissemination may be seen in almost any anatomic location is leading to secondary involvement. Even in endemic areas, hydatid disease involving kidneys are extremely rare, which is prevalent in 2-3% of cases. In cases of primary hydatid disease, mechanisms have not been clear that how the hydatid embryo reaches the kidney but it is postulated that it must have passed through the portal system into the liver and retroperitoneal lymphatics. For many years, most of the renal hydatid cysts remain asymptomatic, and patients usually present late in the course of disease. The main complaints of the patients being dull aching abdominal (Flank) pain, hematuria, palpable flank mass, hypertension, and renal colic. The only pathognomonic clinical sign of renal hydatid disease is hydatiduria, i.e. hydatid cyst in urine. Along with parenchymal destruction, rupture of all the three layers of cysts resulting in free communication with the calyces and pelvis which is known as open or communicating cyst. Acute pain in the loin results as a consequence of the rupture of these cysts in the renal pelvis which is followed by voiding of scolices, hooklets or daughter cysts, with or without hematuria giving rise to gross or microscopic hydatiduria. This hydatid cyst in urine is seen in few cases usually detected microscopically. The diagnosis can be confirmed with the help of serological tests. Microscopic (wet mount) examination may demonstrate daughter cysts in the sample. In this case, history of gross hydatiduria was present (Figure 2), and microscopic examination also showed scolices and daughter cysts (Figure 3). Ultrasound and CT scan of abdomen and pelvis (contrast enhanced) may help to determine the exact location and nature of a cystic pelvic mass, its relationship with adjoining structures, vascular invasion, resectability and also exclude hydatid disease elsewhere. Following treatment with albendazole for longer periods, morphological changes in hydatid cysts have been seen. In most of the cases, complete disappearance of hydatid cyst is a reliable sign of response with albendazole. Reduction in size of the cyst, decrease in cyst tension, increased echogenicity of the cyst contents and thickening or calcification of the cyst wall can occur in...
Asymptomatic hydatid cyst of kidney becomes symptomatic when cyst enlarges in size giving rise to pain and urinary symptoms. There should be a multimodality approach, and the decision of treatment should be individualized for each patient, considering the size and number of cysts, its location, response to the previous treatment and patients factors with associated comorbidities.

REFERENCES

Segmental Neurofibromatosis - A Rare Case Report and Review of Literature

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INTRODUCTION

Segmental neurofibromatosis (SNF) (also known as NF Type V) is a rare disorder characterized by neurofibromas or café-au-lait macules in combination with neurofibromas, which are limited to one segment or region of the body. NF can be divided into 3 broad categories, classified presently on the basis of their molecular aspects: NF Type 1, first described by von Recklinghausen in 1882, which is the most common form; NF Type 2, with the hallmark feature of bilateral vestibular neuromas; and finally, all other types of NF, which include atypical or variant forms of the disease. Crowe et al. proposed the term segmental NF for the localized form of NF was called sectorial NF by Crowe et al., and later, Miller and Sparkes modified the nomenclature to ‘SNF’ - which happens to be the current term for neurofibromas having segmental distribution. Thorax and abdomen (55%) is the most common site for SNF, followed by upper extremities (20%), and lower limb and face (10% each). SNF on the face is very rare, and only about 10 cases have been encountered.

CASE REPORT

A 56-year-old male patient presented to our hospital with complaints of multiple swellings over the abdomen and back for 20 years. The patient had come to seek medical advice for these swellings which were completely asymptomatic according to him. There was no history suggestive of any cognitive impairments or visual disturbances. Furthermore, there was no history of NF in the family members.

On examination, there were multiple, firm, non-tender, skin-colored papules over the trunk grouped along the T10 dermatome bilaterally (Figures 1 and 2). Histopathology examination showed wavy, buckled nuclei of Schwann cells thereby suggesting the diagnosis of neurofibroma. A patient of SNF should be evaluated further to rule out any systemic features consistent with generalized NF. Although the risk of transmission to offspring is small, genetic counseling and evaluation for skin lesions and cognitive impairment can be advised.
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singly. The cells show round ovoid nuclei with regular nuclear membrane and moderate amount of cytoplasm. One of the papules was excised and subjected for histopathology examination which showed wavy, buckled nuclei of Schwann cells (Figure 3. H and E stain, ×200) and further confirmed the diagnosis of neurofibroma.

Since there were multiple neurofibromas grouped along the T10 dermatome and the distribution was consistent with the description of localized NF in the literature, we labeled the case as SNF.

DISCUSSION

SNF is considered as a rare disorder with the unique characteristic of café-au-lait macules and/or neurofibromas following a regional distribution, and its prevalence has been estimated at about 0.0027%. It is proposed that SNF is related to post-zygotic mutation of the NF type 1 gene, which leads to somatic mosaicism. Reports of patients who have localized disease but have children with generalized NF have been explained on the basis of genetic mosaicism.6

The clinical features of SNF were established by Riccardi and classified this different presentation first as NF Type 5.6

Riccardi defined SNF as café-au-lait macules or neurofibromas in a single, unilateral segment of the body, without crossing of midline, no systemic involvement, and no family history. Cases that could not be explained and accommodated in according to Riccardi classification prompted Roth et al. to propose a further subclassification (Table 1): True segmental, localized with deep involvement, hereditary, and bilateral.7

In a group of 56,183 young male observed by Ingordo et al. where the subjects were between the age of 17 and 18 years and represented a population homogeneous with reference to age, sex, race, and country of origin, only 11 cases of NF with relative frequency of 0.020% were found. They observed only one case of SNF during the study (relative frequency 0.0018%). The authors thereby came to a conclusion that SNFs are probably not only underdiagnosed but are 10 times more uncommon than other forms of NF.8

Clinically, patients can be categorized into four groups: (i) those with only pigmentary changes, (ii) with only neurofibromas, (iii) with both pigmentary changes and neurofibromas, and (iv) with isolated plexiform neurofibromas. Although most of the lesions are unilateral, there are reports of bilateral SNF.9

Counselling the patients of segmental neurofibromatosis about the clinical differences and some basic similarities with the classic NF Type 1 should form a part of routine management. However, it is significant to remember that SNF1 should be approached as a localized phenotype of NF1, not a separate form of NF, so that crucial screening is not overlooked.10 The presence of optic gliomas and Lisch nodules has been reported in cases of SNF.11

There is a 5-15% lifetime risk of developing a malignancy with classical NF1, and this is about 2.5 times the risk seen in the general population.12 In patients with SNF, the incidence of malignancy has been approximated at 5.3%.13

CONCLUSION

A patient of SNF should be evaluated further to rule out any systemic features consistent with generalized NF. Although the risk of transmission to offspring is small, genetic counseling and evaluation for skin lesions and cognitive impairment can be advised. The patient should be followed up to monitor disease progression.
and development of any systemic features of NF and any malignant change.

REFERENCES