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A Clinical Study on Primary Lymphoma of the Thyroid in a Tertiary Hospital

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Abstract

Background: The incidence of primary thyroid lymphoma is uncommon and accounts for <5% of all thyroid malignancies. Diagnosis by fine needle aspiration cytology (FNAC) is difficult due to its rarity, and therefore patients may undergo thyroidectomy unnecessarily.

Aim of the Study: The aim of the study was to study the review the incidence of primary thyroid malignancies in a tertiary hospital and study the diagnostic as well therapeutic methods available.

Materials and Methods: A total of 37 patients with primary lymphoma of thyroid over a period of 13 years managed were reviewed retrospectively for their clinical presentation, FNAC reports and modes of management.

Observations and Results: Among 37 patients 26 (70.27%) were women and 11 (29.72%) were male patients. The previous history of thyroid disease was seen in 13 (35.13%) patients. The most common clinical presentation was mass in the neck in 31 (83.78%), dysphagia in 21 (56.75%), dyspnea in 18 (48.64%), and hoarseness of voice in 14 (37.83%). All the patients underwent FNAC. Primary diagnosis of primary thyroid lymphoma was made by FNAC in 12 (32.43%) of the 37 patients. Primary thyroiditis was reported in 4 (10.81%), follicular thyroid carcinoma in 7 (18.91%). In 14 patients (37.83%) FNAC was inconclusive and required hardcore biopsy in 6 (16.215), and 8 (21.62%) required incisional biopsy. Two patients required emergency debulking for airway obstruction. Overall among the 37 patients B-cell Non-Hodgkin’s Lymphoma (NHL) was observed in 31 (83.78%) and T-cell NHL in 6 (16.21%) patients.

Conclusions: In rapidly growing thyroid goiters the diagnosis of primary thyroid lymphoma should be considered. FNAC is limited in diagnosing thyroid lymphoma but useful in the initial workup of thyroid goiters. However, surgical intervention to take biopsy is required to establish the diagnosis and relieve critical airway compression. A combination of chemotherapy and irradiation is the mainstay of management.

Key words: Anaplastic, Chemotherapy, Follicular, Lymphoma, Thyroid, Tumors

INTRODUCTION

Primary lymphoma of the thyroid gland is a rare entity of malignant tumors of the thyroid gland accounting for only 5% of thyroid malignancies and 2% of extranodal lymphomas. Hodgkin’s lymphoma rarely involves the thyroid gland. The diagnosis is usually histological as there are no specific clinical symptoms or signs related to primary lymphoma of the thyroid. The management includes chemotherapy, monoclonal antibody, and radiotherapy. Surgery must be avoided when the diagnosis can be obtained before or intraoperatively. However, thyroidectomy must be done, and it is the main way to get healing in association with chemotherapy with or without radiotherapy. Only rare cases of Hodgkin’s lymphoma presenting in the thyroid have been reported in the literature. The diagnosis is made usually after thyroid surgery for suspected carcinoma of thyroid. The increased use of immuno-cyto-chemical lymphoid markers has improved the diagnosis and categorization of thyroid lymphoma. In recent times it is believed that patients previously diagnosed as anaplastic carcinoma could be suffering from primary thyroid lymphoma. Onset of new symptoms and sudden increase in the size of the pre-existing thyroid swelling are the hallmarks of both thyroid lymphoma and anaplastic
carcinoma. As the anaplastic carcinoma has poor prognosis, it is important to differentiate it from primary thyroid lymphoma with only surviving beyond 2 years. Whereas primary thyroid lymphoma has a favorable outcome with cyclophosphamide-based multimodality chemotherapy in combination with radiotherapy. In the present retrospective study, 37 patients with lymphoma of thyroid were reviewed for their fine needle aspiration cytology (FNAC) reports final histopathological diagnosis and diagnostic as well therapeutic methods used.

Period of Study
This study period was from February 2004 to December 2016 (13 years).

Institute of Study
Department of Surgery, General Hospital Attached to Kannur Medical College, Anjarakandy, Kannur, Kerala.

MATERIALS AND METHODS
A total of 37 patients diagnosed with primary thyroid lymphoma in the Department of Surgery between February 2004 and December 2016 were included in this retrospective study. Institutional Ethical Clearance was obtained before commencement of the study.

Inclusion Criteria
1. Patients aged above 36 years and below 60 years were included.
2. Patients with thyroid goiters with rapidly increasing size were included.
3. Patients with dysphagia were included.
4. Patients with dyspnea were included.
5. Patients with hoarseness of voice were included.

Exclusion Criteria
1. Patients below the age of 35 and above the age of 60 years were excluded.
2. Patients with FNAC reports of inflammatory diseases of the thyroid were excluded.
3. Patients with thyrotoxicosis were excluded.

The demographic data and clinical course of the condition were elicited and recorded. FNAC reports (37) were analyzed from the case sheets. Hardcore biopsy and incisional biopsy were done where FNAC was inconclusive. The final diagnosis in all the patients was analyzed. The treatment adopted in each case was studied, and the data were tabulated. The 5 years survival rate was calculated. All the data were analyzed using standard statistical methods.

OBSERVATIONS AND RESULTS
Among 37, 26 (70.27%) were women and 11 (29.72%) were male patients. The male to female ratio was 1:2.36. The age group of the patients in the study was 36–59 years with a mean age of 49.25 ± 3.50. In 19/37 patients the tumor was observed in the age group of 51–60 years (51.35%), [Table 1].

The previous history of thyroid disease was seen in 13 (35.13%) patients. The most common clinical presentation was mass in the neck in 37 (100%), dysphagia in 21 (56.75%), dyspnea in 18 (48.64%), and hoarseness of voice in 14 (37.83%) [Table 2]. Other signs and lab investigations are also shown in Table 2.

All the patients underwent FNAC. Primary diagnosis was made by FNAC in 12 (32.43%) of the 37 patients. Primary thyroiditis was reported initially in 4 (10.81%), follicular thyroid carcinoma in 7 (18.91%). In 14 patients (37.83%) FNAC was inconclusive and required hardcore biopsy in 6 (16.21%), and 8 (21.62%) required incisional biopsy. Two patients required emergency debulking for airway obstruction. Overall, among the 37 patients B-cell Non-Hodgkin’s Lymphoma (NHL) were observed in 35 (83.78%) and T-cell NHL in 1 (02.70%) patients [Table 3].

All the 37 patients were managed with chemotherapy (CHOP regimen: Cyclophosphamide, doxorubicin, vincristine, and prednisolone). Radiotherapy was given in

| Table 1: The age and gender incidence in the study group (n=37) |
|-----------------|---------|---------|----------|
| Age groups      | Male - 11 | Female - 26 | Percentage |
| 36–40-04        | 02      | 02      | 10.81    |
| 41–45-06        | 02      | 04      | 16.21    |
| 46–50-08        | 03      | 05      | 21.62    |
| 51–55-10        | 02      | 08      | 27.02    |
| 56–60-09        | 02      | 07      | 24.32    |

| Table 2: The symptoms and signs in the study group (n=37) |
|-----------------|---------|
| Symptoms/signs  | n (%)   |
| Previous history of thyroid disease | 13 (35.13) |
| Thyroid swelling | 37 (100) |
| Dysphagia       | 21 (56.75) |
| Dyspnea         | 18 (48.64) |
| Hoarseness of voice | 14 (37.83) |
| Palpable lymph nodes | 16 (40.54) |
| Imaging showing nodes | 11 (35.15) |
| Euthyroid       | 25 (67.56) |
| Hypothyroid     | 09 (24.32) |
| Hyperthyroid    | 03 (08.10) |
| Antimicrosomal and antithyroglobulin antibodies | 10 (27.02) |
Primary lymphoma of the thyroid is a rare entity reported by many authors in the literature. NHL of the thyroid is reported commonly in females. In this study, the male to female ratio was 1:2.56. In certain clinical reports, the ratio was as high as 1:4. Clinical picture similar to primary lymphoma of the thyroid is also observed in anaplastic carcinoma of the thyroid; rapid growth, which might be associated with dyspnea, dysphagia, pain, and hoarseness of voice. Rh primary lymphoma of the thyroid occurs commonly in the age groups of the 5th to 7th decades. Among this majority of the patients have a history of Hashimoto's thyroiditis (range: 40–80%). Holm et al. were of the opinion that patients with Hashimoto's thyroiditis have a greater risk of subsequently developing thyroid lymphoma, with an overall 60–80-fold higher risk than in the general population. In this study, the previous history of Hashimoto's Thyroiditis was found in 04/37 patients. It is estimated that 1 in 200 cases of Hashimoto's disease goes on to develop primary thyroid lymphoma. There is also evidence that large cell lymphoma probably evolves from persistent low-grade mucosa-associated lymphoid tissue (MALT) malignant lymphoma, suggesting a morphological progression from chronic lymphocytic thyroiditis to low-grade MALT lymphoma, and subsequently, to high-grade large-cell lymphoma. According to Ben Ezra et al., the time lapse between occurrence of Hashimoto's and malignant transformation is 9–10 years. As the value of FNAC in the diagnosis of NHL true core biopsy or incisional biopsy is often required for confirmation; occasionally even thyroidectomy is required.

Scholfield et al. are of the opinion that serial autoantibody assays in patients with Hashimoto's thyroiditis may help predicting the onset of lymphomatous change in this condition. To differentiate between high-grade lymphoma and anaplastic carcinoma by immuno-histochemical grounds using antibodies to cytokeratins and leukocyte common antigens. The essential difference between a reactive and a neoplastic lymphoid infiltrate is the presence of light chain restriction in the latter. Lymphoma tumors usually have a diffuse growth pattern; residual follicles are often seen within the tumor at the border. Similar to the findings of the present study, most thyroid lymphomas are of B-cell origin and predominantly of diffuse large-cell type. The second most common histological type is MALT lymphoma. Other less frequently encountered types include Hodgkin's disease, Burkitt's lymphoma, and Plasma cytoma. T-cell lymphoma is extremely rare, with only a few cases reported in the literature. Most of the T-cell lymphomas reported from Asia; they are associated with a worse prognosis than is B-cell lymphoma. Management is based on its histological subtype, its stage, bulk of the tumor as well as the other associated comorbid factors. In this study, majority of patients presented with Stage I and II disease (about 80%). The overall survival ranges from 35% to 79%. The 5-year survival for each stage is 80% for Stage I, 50% Stage for IIE, and < 36% for Stage III and IV.

A similar observation was made by DiBiase et al. with a relapse rate of 30%. Many centers use the CHOP chemotherapy regimen. Pedersen and Pedersen are of the opinion that histological grading is not a statistically significant factor in survival; however, it is significant in Stage III and IVE. In this study overall survival was 91.89%, with a mean follow-up of 36 months (range: 6–42 months). Two patients who underwent emergency tumor debulking for acute respiratory distress lost for chemotherapy after two cycles. The tumor recurred, and he succumbed 6 months after surgery in spite of restarting chemotherapy.

### DISCUSSION

Primary lymphoma of the thyroid is a rare entity reported by many authors in the literature. NHL of the thyroid is reported commonly in females. In this study, the male to female ratio was 1:2.56. In certain clinical reports, the ratio was as high as 1:4. Clinical picture similar to primary lymphoma of the thyroid is also observed in anaplastic carcinoma of the thyroid; rapid growth, which might be associated with dyspnea, dysphagia, pain, and hoarseness of voice. Rh primary lymphoma of the thyroid occurs commonly in the age groups of the 5th to 7th decades. Among this majority of the patients have a history of Hashimoto's thyroiditis (range: 40–80%). Holm et al. were of the opinion that patients with Hashimoto's thyroiditis have a greater risk of subsequently developing thyroid lymphoma, with an overall 60–80-fold higher risk than in the general population. In this study, the previous history of Hashimoto's Thyroiditis was found in 04/37 patients. It is estimated that 1 in 200 cases of Hashimoto's disease goes on to develop primary thyroid lymphoma. There is also evidence that large cell lymphoma probably evolves from persistent low-grade mucosa-associated lymphoid tissue (MALT) malignant lymphoma, suggesting a morphological progression from chronic lymphocytic thyroiditis to low-grade MALT lymphoma, and subsequently, to high-grade large-cell lymphoma. According to Ben Ezra et al., the time lapse between occurrence of Hashimoto's and malignant transformation is 9–10 years. As the value of FNAC in the diagnosis of NHL true core biopsy or incisional biopsy is often required for confirmation; occasionally even thyroidectomy is required.

### CONCLUSIONS

In rapidly growing thyroid goiters the diagnosis of primary thyroid lymphoma should be considered. FNAC is limited in diagnosing thyroid lymphoma but useful in the initial workup of thyroid goiters. However, surgical intervention to take biopsy is required to establish the diagnosis and relieve critical airway compression. A combination of chemotherapy and irradiation is the mainstay of management.

### REFERENCES


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**Table 3: The nature of primary lymphoma in the study (n=37)**

<table>
<thead>
<tr>
<th>Final diagnosis</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hodgkin's Lymphoma</td>
<td>35 (94.59)</td>
</tr>
<tr>
<td>Hodgkin's Lymphoma</td>
<td>01 (2.70)</td>
</tr>
</tbody>
</table>

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Analysis of Bacteriological Profile of Bile in Cholecystectomy Patients

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Incidence of gallstone increases with age. It is more common in females than in males (M:F = 1:4). About 50% of patients with gallstones are asymptomatic. 1–2% of asymptomatic patients will develop symptoms requiring cholecystectomy per year, making cholecystectomy one of the most common operations performed by surgeons.

The etiopathogenesis of gallstone is multifactorial. It varies according to the type of gallstone. Primarily gallstones can be divided into two major groups. First is a pure gallstone contributing to 10% of gallstones. Second is a mixed and combined gallstone which accounts for 90% of gallstones. Mixed gallstones have increased preponderance of cholecystitis. Infection seems to be a major cause of gallstones.

Aim
The aim of the study was to study analyzes the bacteriological profile of the bile collected from gallbladder in patients undergoing cholecystectomy.

INTRODUCTION

Calculus disease of biliary is one of the most common disorders affecting the gastrointestinal tract constituting a major cause of morbidity. There has been a marked rise in the incidence of gallstone disease in the west during the past century. In the UK, USA, and Australia, the prevalence rates vary from 15 to 25%. In India, it is more common in North India than in South India. Similarly, the incidence in Eastern India is higher than in the west.

Infection seems to be a major cause of gallstones.

Abstract

Introduction: Cholecystectomy is currently a frequently performed operation. The presence of gallstones within either the gallbladder or biliary tree is associated with the bacterial colonization of the bile.

Aim: The aim of the study was to study analyzes the bacteriological profile of the bile collected from gallbladder in patients undergoing cholecystectomy.

Materials and Methods: About 5 ml bile was aspirated from all patients, this collected bile from gallbladder before cholecystectomy was transported to the laboratory in sterile test-tube. The specimen was evaluated to find out whether it is sterile or has any bacteria present.

Results: Gallstone disease is common in females than in the males, and the age group was 51–65 years. 21 cases showed organisms in bile culture of which 17 were females and 4 were males. The most common microorganism isolated from bile culture was Klebsiella.

Conclusion: 42% of patients shown positive bile culture. The most common microorganism isolated from bile culture was Klebsiella.

Key words: Bacteriology, Cholecystectomy, Surgery
MATERIALS AND METHODS

This observational study was conducted in the Department of Surgery at Tirunelveli Medical College Hospital. Inclusion criteria were patients undergoing cholecystectomy and patient giving informed consent for study. Patients’ age >12 years and <65 years, proven cases of gallstone disease for cholecystectomy both open and laparoscopic cholecystectomy. Exclusion criteria: Acute cholecystitis, acute a calculus cholecystitis emphysema gallbladder mucocele of the gallbladder, jaundice patients, and gallstones with multiple common bile duct stones (multiple CBD and intrahepatic stones). Patients were refused surgery. Patient's demographic data such as name, age, and sex noted. Detailed history was taken with physical examination and investigations were done.

Bile was aspirated from the gallbladder of the patient who underwent open cholecystectomy using a sterile syringe (5 ml). In case of laparoscopic cholecystectomy, bile was collected from the excised gallbladder. The sample was collected in a sterile bottle and was transferred to microbiology laboratory. In the laboratory the bile sample was inoculated in the basal media such as nutrient agar, MacConkey agar, and blood agar in the temperature of 37°C and the results were read after 18–24 h for the growth of organisms. Identification of species was done using biochemical tests such as indole test, citrate test, urease test, triple sugar iron test, oxidase test, gram staining, and motility test. Antibiotic sensitivity test was done with amikacin, gentamycin, ciprofloxacin, ceftazidime, cefotaxime, ceftriaxone, cotrimoxazole, and ceftazidime + clavulanic acid.

RESULTS

In our study, the age group of 51–65 years was more commonly affected, 22 among 50 cases were found to belong to this group. Females were more commonly affected in the ratio of 3.2 Table 1.

The most common clinical presentation among the cases studied was abdominal pain; all the cases studied presented with abdominal pain. The second most common presentation was nausea/vomiting, which was the presenting symptom in 18 cases Table 2.

Culture reports of the bile revealed organism in 21 cases. Klebsiella was the most common organism followed by Escherichia coli Table 3.

In our study, most of the stones recovered from the gallbladder were black/pigment stones, which constituted 68% of the cases studied Table 4.

| Table 1: Distribution gender and age group |
|-----------------|-------------|-------------|-----|
| Age             | Male        | Female      | Total |
| 13–20           | 0           | 0           | 0    |
| 21–30           | 2           | 5           | 7    |
| 31–40           | 4           | 8           | 12   |
| 41–50           | 1           | 8           | 9    |
| 51–65           | 12          | 10          | 22   |
| Total           | 19          | 31          | 50   |

| Table 2: Clinical presentations of gallstone |
|-----------------|-------------|
| Presentation    | Cases       |
| Abdominal pain  | 50          |
| Fever           | 11          |
| Nausea/vomiting | 18          |

| Table 3: Bacteriology of bile culture in gallstone distance |
|-----------------|-------------|
| Bacteria        | Number of cases |
| Klebsiella      | 10          |
| E. coli         | 4           |
| Coagulase (-) S. aureus | 3 |
| P. vulgaris     | 2           |
| Pseudomonas     | 2           |
| No growth       | 29          |

S. aureus: Staphylococcus aureus, E. coli: Escherichia coli, P. vulgaris: Proteus vulgaris

| Table 4: Color of gallstones |
|-----------------|-------------|
| Color           | Number of cases |
| Black/pigment stones | 34          |
| Yellow/cholesterol stones | 16         |

| Table 5: Distribution of surgical treatment |
|-----------------|-------------|
| Procedure       | Number of cases |
| Open cholecystectomy | 28          |
| Laparoscopy cholecystectomy | 17          |
| Laparoscopy converted to open | 5           |

28 patients underwent open cholecystectomy, 17 patients were underwent laparoscopy cholecystectomy and 5 cases laparoscopy converted to open Table 5.

DISCUSSION

Cholecystitis is an inflammatory condition of the gallbladder characterized by the inflammation of the gallbladder wall, which may be due to retention of bile in gallbladder or secondary to infection by microorganisms, predominantly E. coli, Klebsiella, Enterobacter, and Bacteroides species.17,8

The age and sex incidence of gallstone formation observed in our. The incidence was more in females (62%) 31 numbers
than in males (28%) 19 numbers among the total 50 cases. Similar observations were given by National Academy of Medical Sciences in Nepal.[9] The incidence of gallstone was highest in 51–65 years age group in both sexes followed by age group 31–40 years.[10] The clinical presentation of gallstone disease observed in our study was abdominal pain followed by nausea and vomiting. The intermittent nature of pain and vomiting of proximal gastrointestinal material, later becoming dark and febrile is due to the “tumbling” gallstone advancement.[11,12] The bacteriology of bile culture observed in our study revealed Klebsiella as the most common organism followed by E. coli. Hazrah et al. studied live bacteria in gallstones shown Klebsiella spp. to be the most common organisms isolated (18%) followed by E. coli.[13] Many studies shown E. coli was the most common organism isolated in gallstones.[14,15]

CONCLUSION

Gallstone disease is common in females than in the males. All the cases presented with right hypochondriac pain. 42% of patients showed positive bile culture. The most common microorganism isolated from bile culture was Klebsiella.

REFERENCES


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Peptic Ulcer Disease in the Proton Pump Inhibitor Era in Coastal Odisha

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Abstract

Background and Objective: There is a wide variation in the prevalence of peptic ulcer in India both before and since the use of endoscopy. We studied the risk factors, mode of presentation and treatment outcome in patients with peptic ulcer attending two gastrointestinal (GI) clinics in coastal Odisha, and its relationship with Helicobacter pylori infection.

Methods: We investigated patients who underwent a health inspection for upper GI symptoms. Upper GI endoscopy was performed, and biopsy specimens were collected from the stomach of the patients who were found to have peptic ulcer disease (PUD). All patients with peptic ulcer were prospectively followed after H. pylori eradication regimen. After a minimum of 4 weeks repeat, upper GI endoscopy was performed to assess healing of ulcers.

Results: Between 2015 and 2017, 3000 patients with peptic ulcer were seen, of whom 1480 (49.33%) had duodenal ulcer, 917 (30.56%) had gastric ulcer, and 603 (20.1%) had both duodenal and gastric ulcer. The mode of presentation was epigastric pain (36%), dyspepsia (26%), GI bleed (24%), and gastric outlet obstructive symptoms (14%). Risk factors were smoking (38%), nonsteroidal anti-inflammatory drugs (NSAID) intake (22%), alcohol intake (13%), and indigenous drug (8%). Among 926 patients, rapid urease test (RUT) could be done. 682 (73.65%) were positive, and 244 (26.35%) were negative for RUT. Among the H. pylori positive subjects duodenal ulcer was most common (49.85%) followed by gastric ulcer (30.8%) and both gastric and duodenal ulcer (19.35%). Treatment with H. pylori eradication regimen resulted in complete healing 75%, partial healing in 15% but non-healing still persisted in 10% patients.

Conclusions: PUD is very common in coastal eastern Odisha. Among them, duodenal ulcer is the most common variety. Epigastric pain is the most common type of presentation. Smoking is the most common risk factor followed by NSAID intake. H. pylori association causes mostly duodenal ulcers. Complete healing of ulcers occurs in two-third cases after H. pylori eradication regimen. Further studies required to assess the etiology in remaining partial and non-healing ulcer cases.

Key words: Epigastric pain, Helicobacter pylori, Nonsteroidal anti-inflammatory drugs intake, Peptic ulcer

INTRODUCTION

The term peptic ulcer disease (PUD) is used broadly to include ulcerations in the stomach and duodenum from a number of causes. Regardless of the inciting agent, the role of acid and pepsin in the genesis and spread of mucosal injury remains a combining aspect of the pathogenesis of PUD. Marshall and Warren has revolutionized the pathophysiology and concept of treatment of PUD and also transformed it from a chronic recurrent disease to a curable one. PUD results in various complications such as bleeding, perforation, and gastric outlet obstruction. H. pylori infection and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) are the most well-known causal factors for PUD. Although the prevalence of PUD caused by H. pylori has been decreasing due to eradication therapy, the prevalence of PUD induced by NSAIDs or aspirin is increasing because of the worldwide increase in the aging population. India is a vast country known for its rich history, culture, and food. It is also the typical developing country with a vast rural population living in poverty. The prevalence of H. pylori in the Indian subcontinent can be as high as 80% or more in rural areas. Therefore, new
strategies for the prevention and cure of PUD in India are important.\textsuperscript{[38]}

It is difficult to detect PUD in asymptomatic individuals. In some cases, it is detected due to serious complications, whereas in others, it is detected on screening endoscopy. As the proportion of the population that receives regular health examination increases, the detection of asymptomatic PUD also appears to increase.

According to the previous studies, PUD has a strong association with cigarette smoking, advanced age, former alcohol use, obesity, and specific chronic diseases.\textsuperscript{[10]} However, the clinical significance and pathogenic factors associated with asymptomatic PUD remain unclear to date.

Therefore, the present study aimed to investigate the prevalence of symptomatic and asymptomatic PUD in individuals receiving regular medical check-ups in coastal Odisha, India, and we attempted to identify risk factors for the development of symptoms in patients with PUD.

**METHODS**

This prospective observational study was conducted in two gastrointestinal (GI) clinics in Cuttack, an eastern coastal region of Odisha, India, from January 2015 to January 2017. Consecutive patients of both genders, coming to the clinic with the symptoms suggestive of PUD and dyspepsia, i.e., upper abdominal pain, anorexia, vomiting, bloating, belching, GI bleeding, and gastric outlet obstructive symptoms were subjected to endoscopy. Patients are having gastric ulcer, duodenal ulcer or both on upper GI endoscopy were included in the study. In the study, period a total of 3000 patients with endoscopic findings of PUD were finally enrolled.

PUD was defined on the basis of the endoscopy findings as a mucosal break of diameter 5 mm or larger, covered with fibrin. Mucosal breaks smaller than 5 mm were considered as erosions. The endoscopic procedure was conducted using video endoscope (GFI-250, Olympus, Tokyo, and Japan). Total two biopsy specimens were collected from antrum of the stomach of the patients who were found to have PUD. Endoscope and biopsy forceps were disinfected using 2% glutaraldehyde. Instruments were immersed in the solution for 15 min. All subjects provided written consent before the procedure.

Rapid urease tests (RUT) were performed rapidly with one of the four antral specimens using commercially available kit at diagnosis of PUD. Results were available at the end of 10 min and noted in the datasheet.

\textit{H. pylori} positive patients were treated with 14 days course of triple therapy for \textit{H. pylori} along with PPI and sucralfate and were followed up. Patients were followed up for compliance of drugs and side effects. Follow-up endoscopies were performed at least 4 weeks after completion of therapy.

All analyses were conducted using SPSS version 19.0 and $P < 0.05$ was considered statistically significant.

**RESULTS**

Between 2015 and 2017, 3000 patients with peptic ulcer were identified by upper GI endoscopy which accounted for 25% of total endoscopy performed. Of them, 2256 patients were male, and 744 patients were female with a male-female ratio of approximately 3:1. Age of the patients ranged from 8 to 95 years with a mean age of 35 years. The patients were mostly of low socioeconomic condition (75%). The endoscopic findings at enrolment are shown in Table 1. Duodenal ulcer was the most common peptic ulcer.

Most common risk factor was smoking. Different risk factors are shown in Table 2.

Most common mode of presentation was an epigastric pain. Different modes of presentation are shown in Table 3.

On the basis of findings suggestive of PUD at endoscopy, 3000 patients were included in the study. Among 926

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**Table 1: Endoscopic findings at enrolment**

<table>
<thead>
<tr>
<th>Peptic ulcer</th>
<th>Total n=3000 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duodenal ulcer</td>
<td>1480 (49.33)</td>
</tr>
<tr>
<td>Gastric ulcer</td>
<td>917 (30.56)</td>
</tr>
<tr>
<td>Duodenal ulcer and gastric ulcer</td>
<td>603 (20.1)</td>
</tr>
</tbody>
</table>

**Table 2: Risk factors for peptic ulcer**

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>38</td>
</tr>
<tr>
<td>NSAID intake</td>
<td>22</td>
</tr>
<tr>
<td>Alcohol</td>
<td>10</td>
</tr>
<tr>
<td>Indigenous drug</td>
<td>13</td>
</tr>
<tr>
<td>Multiple</td>
<td>8</td>
</tr>
<tr>
<td>NSAID: Nonsteroidal anti-inflammatory drugs</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Mode of presentation for peptic ulcer**

<table>
<thead>
<tr>
<th>Mode of presentation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epigastric pain</td>
<td>36</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>26</td>
</tr>
<tr>
<td>GI bleed</td>
<td>24</td>
</tr>
<tr>
<td>Gastric outlet obstructive symptoms</td>
<td>14</td>
</tr>
</tbody>
</table>
patients, RUT could be done. 682 (73.65%) were positive and 244 (26.35%) were negative for RUT.

Among these 682 H. pylori positive patients, 340 patients had duodenal ulcer, and 220 had gastric ulcers, and 132 patients had both gastric and duodenal ulcer [Table 4].

All patients with PUD treated with anti-H. pylori regimen along with PPI and sucralfate including those were H. pylori positive. Patients were treated with 14 days course of triple therapy for H. pylori and were followed up. Triple therapy contained 2 weeks regimen of amoxicillin (750 mg, bd), clarithromycin (500 mg, bd), and esomeprazole (40 mg, bd). 521 patients returned for follow-up at least 4 weeks after completion of 14 days triple therapy. Endoscopy was performed in the 521 patients who returned for follow-up, 65 patients had duodenal ulcer, 32 had gastric ulcer, and 23 had both duodenal ulcer and gastric ulcer. Complete healing occurred in almost 75% of patients [Table 5].

**DISCUSSION**

Peptic ulcer is frequently seen in India. In some studies, a higher incidence has been reported from southern India compared to that of northern India. Other studies, however, have failed to confirm such regional differences. Various factors including differences in diet, socioeconomic status, occupation, smoking, or alcohol consumption have been incriminated for these differences. We encounter very high number of PUD in this PPI era also. Many patients take some PPI which are available widely before consulting with gastroenterologist. Still then it accounts to 25% of our total endoscopy. Mean age of the patients in this study was 35 years, males were predominant (75%) and most of the patients were from low socioeconomic class (75%). We had 26 children of below 16 years of age. The H. pylori positivity in our study is more or less consistent with other studies in our country carried out on patients of PUD due to H. pylori. According to Maastricht III consensus conference – 2005, diagnosis is confirmed and treatment can be started if RUT is positive. In the current study, H. pylori status was considered to be positive if RUT was found to be positive. Epidemiological studies from India have shown 70%, 77.2%, 78%, and 79% prevalence of H. pylori infection. Our study also revealed, in accordance with other studies, similar higher association of H. pylori with duodenal and gastric ulcer. H. pylori eradication rate in this study was 75%. According to Maastricht III Consensus Report, H. pylori eradication should be more than 80% for any eradication references to be effective. However, most of published studies in our country failed to attain eradication rate more than 70%. Many of these trials used a single test (RUT) to determine clearance of H. pylori infection. When rigorous criteria (i.e., a combination of negative urease test, negative histology, and negative urea breath test) were applied, as in a prospective trial from northern India, the eradication rate was considerably lower. Healing rate of peptic ulcer was 75% in this study. Pooled data show that eradication therapy heals >90% of duodenal ulcers and >85% of gastric ulcers, while individual studies repeatedly confirm that it is more effective at healing ulcers than conventional treatment with antisecretory drugs. In a study by Suzuki et al., the eradication rate of H. pylori was 84% in the gastric ulcer group and 89% in the duodenal ulcer group. An intimate connection that exists between peptic ulcer and H. pylori status; and causal link between the eradication of H. pylori and healing of peptic ulcers is well known. However, adequate ulcer healing was achieved in this study despite relatively low eradication rate.

**CONCLUSION**

PUD is very common in coastal eastern Odisha. Among them duodenal ulcer is the most common variety. Epigastric pain is the most common type of presentation. Smoking is the most common risk factor followed by NSAID intake. H. pylori association causes mostly duodenal ulcers. Complete healing of ulcers occurs in two-thirds cases after H. pylori eradication regimen. Further studies required for complete healing of ulcers in remaining partial and non-healing ulcer cases.

**REFERENCES**

3. Marshall BJ, Warren JR. Unidentified curved bacilli in the stomach of
17. Tovey F. Peptic ulcer in India and Bangladesh. Gut 1979;20:329-47.
Comparison of Esmolol and Lidocaine for Blunting of Stress Response during Laryngoscopy and Endotracheal Intubation

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Abstract

**Background:** Direct laryngoscopy and endotracheal intubation lead to stimulation of strong cardiovascular responses. Various attempts have been made to attenuate these responses. The aim of this study was to compare the efficacy and safety of intravenous esmolol and lidocaine in suppressing the cardiovascular response to laryngoscopy and tracheal intubation in normotensive patients undergoing general anesthesia.

**Materials and Methods:** This randomized controlled study was conducted in 90 normotensive patients of age group 18–60 years and American Society of Anesthesiologists (ASA) physical Status I or II undergoing elective surgeries. The patients were randomly divided into three groups of 30 patients each (n = 30) - control, (C) lignocaine (L), and esmolol (E). Group - “C” received 10 ml normal saline, Group -“L” received 2 mg/kg diluted up to 10 ml preservative-free lidocaine, and Group -“E” received 2 mg/kg esmolol IV diluted up to 10 ml, 2 min before intubation. Induction was done with thiopentone 5 mg/kg, fentanyl 2 µg/kg, and vecuronium 0.1 mg/kg uniformly as per protocol. Thereafter, changes in heart rate (HR), systolic blood pressure (SBP), diastolic BP (DBP), and mean arterial BP (MAP), were measured before induction of general anesthesia (baseline), 1, 3, and 5 min after tracheal intubation. Patients were also observed for any complications. Statistical analysis was performed by ANOVA and post hoc tukey test.

**Results:** Group C had statistically highly significant (P ≤ 0.0001) value of HR, SBP, DBP, and MAP at all time interval after intubation when compared to Group L and Group E, and, Group L had statistically significant (P ≤ 0.05) higher values of hemodynamic variables at all time interval when compared to Group E.

**Conclusions:** Both esmolol and lignocaine are effective in attenuating the stress response due to laryngoscopy and intubation, but esmolol maintains hemodynamic variables more stable.

**Key words:** Esmolol, Intubation, Laryngoscopy, Lidocaine, Stress response

INTRODUCTION

Hypertension and tachycardia usually accompany laryngoscopy and tracheal intubation; it is generally transient occurring 30 s after intubation and lasting for <10 min due to reflex sympathetic stimulation.¹² This stress response should be avoided, especially in patients with cardiovascular or intracranial diseases. Various pharmacological agents have been used to attenuate the pressure responses.³ Topical and intravenous lidocaine, opioids, inhaled anesthetics, calcium channel blocker, vasodilators or beta/adrenergic blockers, magnesium sulfate, pregabalin, etc., have been tried to blunt these hemodynamic responses. Lidocaine has been found to be inconsistently effective.⁴⁻⁶ Esmolol (beta-adrenergic receptor antagonist + ultra-short-acting) provides hemodynamic stability during laryngoscopy and tracheal intubation without side effects.⁷

Previous studies have shown that the control of the cardiovascular response to endotracheal intubation is important to reduce adverse cardiovascular outcomes.⁸

with cardiovascular or intracranial diseases. Various pharmacological agents have been used to attenuate the pressure responses.³ Topical and intravenous lidocaine, opioids, inhaled anesthetics, calcium channel blocker, vasodilators or beta/adrenergic blockers, magnesium sulfate, pregabalin, etc., have been tried to blunt these hemodynamic responses. Lidocaine has been found to be inconsistently effective.⁴⁻⁶ Esmolol (beta-adrenergic receptor antagonist + ultra-short-acting) provides hemodynamic stability during laryngoscopy and tracheal intubation without side effects.⁷

Previous studies have shown that the control of the cardiovascular response to endotracheal intubation is important to reduce adverse cardiovascular outcomes.⁸
The main purpose of this study was to determine the efficacy and safety of intravenous lidocaine and esmolol in attenuating hemodynamic response to laryngoscopy and intubation in normotensive patients undergoing elective general surgeries under general anesthesia requiring endotracheal intubation.

**MATERIALS AND METHODS**

After an institutional approval by the Ethics Committee of the institution, the study was started from December 2016, to April 2017. Informed consent was obtained. Proper preanesthetic check-up and routine investigations were done. 90 consenting adult patients aged 18–65 years of age of either sex being non-hypertensive, American Society of Anaesthesiologists Grade I or II undergoing elective surgery other than cardiac surgery under general anesthesia with endotracheal intubation, oropharyngeal anatomy of Mallampati Class I and II, were included in our study protocol. Whereas, patients who were morbidly obese, pregnant and lactating females, patients with cardiopulmonary and renal disease, heart rate (HR) <60 beats per minute, basal systolic blood pressure (SBP) <100 mm/Hg, and other conditions such as bronchial asthma, diabetes mellitus, drug allergies, anticipated difficult intubation, and in cases where duration of laryngoscopy exceeded 15 s were excluded. Allocation concealment was ensured with sealed opaque envelopes. Our study was comparative, prospective, randomized, and double-blinded in a normotensive healthy population. The sample size taken was 90 generated using a sample size calculator. The study groups were randomly divided into three groups (C-control/L-lignocaine/E- esmolol) by a computer-generated randomization table. Dose used: Esmolol 2 mg/kg BW and lignocaine 2 mg/kg BW. A anesthetist colleague (Person A) who was not involved in the randomization process was made to prepare the study drugs by diluting to 10 ml. All three drugs were color-coded to improve blinding. Another Person B monitored the HR, SBP, and diastolic BP (SBP/DBP) mean arterial pressure (MAP) at various time intervals while Person C was responsible for intubation of the patients having a good experience of the technique. Person A and C were kept constant throughout the study. Person B, C, and the patient were kept unaware of the drug injected to enable double-blinding.

After patient confirmation, short pre-operative history taking and clinical examination were done. Procedure explained to the participants, and a written informed consent was obtained from each participant. Baseline vital parameters of patients’ including HR, systolic arterial pressure (SAP), diastolic arterial pressure; MAP, and oxygen saturation were recorded in the operation theater through routine standard monitors. In the operating room, IV line was secured with 18-G venous cannula, and Ringer’s lactate infusion (8 ml/kg) was started. All the patients were uniformly pre-medicating with IV midazolam 0.05 mg/kg and glycopyrrolate 0.004 mg/kg, and 10 min before induction. The study drugs were prepared to a volume of 10 ml.

Patients were pre-oxygenated with four to five breaths of 100% oxygen. Induction done with 5 mg/kg IV thiopentone sodium in incremental doses until loss of eyelash reflex, fentanyl 2 µg/kg and 0.1 mg/kg IV vecuronium bromide given slowly, followed by administration of the study drugs (normal saline, esmolol, or lignocaine) 2 min before laryngoscopy and intubation.

Patients were ventilated with oxygen and 2% sevoflurane using IPPV with a fresh gas flow of 8 l/min by Bains circuit until intubation. About 2 min after study drug being given, laryngoscopy was performed with a Macintosh laryngoscope blade and trachea intubated by a trained anesthetist with an appropriate size cuffed endotracheal tube. After confirmation of correct placement of ET tube, anesthesia was then maintained with O2/N2O/Sevo (50:50:1%). Additional doses of vecuronium bromide and fentanyl 1 µg/kg if necessary were administered to maintain surgical relaxation and analgesia. Surgery was allowed to start only after 10 min of intubation. At the end of surgery neuromuscular blockade reversal was done with injection neostigmine 0.05 mg/kg and injection glycopyrrolate 0.1 mg/kg. IV ondansetron 0.08 mg/kg was given to patients 30 min before the completion of the surgery. The tracheal tube was removed after the adequate spontaneous ventilation established.

HR, SBP, DBP, MAP, SpO2 (oxygen saturation), and electrocardiogram changes were recorded before induction (Basal) and after tracheal intubation at 1, 3, and 5 min for the study.

**Parameters and Statistical Analysis**

Summary statistics of patient gender, age, weight, SpO2 for all three groups were reported as means ± standard deviation. HR, SBP, DBP, and MAP were recorded, before induction (baseline), after tracheal intubation at 1, 3, and 5 min. Patients were also observed for complications such as hypotension, hypertension, arrhythmias, and hypoxemia. For statistical analysis, hemodynamic variables were represented by mean ± standard deviation (SD). Results on continuous measurements are presented as mean ± SD. Significance was assessed at 5% level of significance. Analysis of variance was used to assess the significance of study parameters between three or more groups of patients. *Post hoc* Tukey test was used to find the pairwise significance.
RESULTS

All the three groups were comparable in demographic data [Table 1]. The basal readings of HR, SBP, DBP, and MAP were similar in all three groups. Maximum laryngoscopy response was recorded at 1 min all three groups. The vital parameters never reached near baseline by 5 min in Group C. In Group E, hemodynamic variables reached near baseline by 3 min, and at 5 min they fell below the baseline. In Group L, all vital parameters reached near baseline by 5 min. Group C had statistically highly significant (P ≤ 0.0001) higher value of HR, SBP, DBP, and MAP at all time interval after intubation when compared to Group L and Group E, and Group L had statistically significant (P ≤ 0.05) higher values of hemodynamic variables at all time interval when compared to Group E. Therefore, it can be inferred that the lignocaine and esmolol both are effective in attenuating intubation response, but esmolol seems to be more effective than lignocaine in attenuating laryngoscopic and intubation response [Tables 2-5].

DISCUSSION

King et al. first described the hemodynamic stress response due to laryngoscopy and intubation more than 60 years ago.[9] Orotracheal intubation consists of two phases: Direct laryngoscopy and passing of endotracheal tube through the vocal cords and trachea.[10] It has been seen in various studies that increase in HR occurs during endotracheal intubation whereas the greatest increase in BP occurs during laryngoscopy.[11] Both sympathetic and parasympathetic element has been found as a mechanism to this intubation response. The sympathetic response is a polysynaptic pathway due to glossopharyngeal and vagus nerve forming the afferent arc to the sympathetic nervous system through the brain stem and spinal cord causing increased firing of the cardio-accelerator fibers and release of adrenergic mediators including norepinephrine, epinephrine, and vasopressin. The net effect of this autonomic surge is an increased BP, HR, pulmonary artery wedge pressure, and decreased ejection fraction. On the other hand, the parasympathetic reflex is monosynaptic, more common in children but can occur in some adults. The reflex is mediated by the increased vagal tone at the SA node.[12]

Both HR and BP are determinants of oxygen delivery and demand. An increase in HR deleteriously affects both supply and demand of oxygen. BP is related to cardiac output (CO) and systemic vascular resistance (SVR). A change in either CO or SVR will result in a compensatory change in the other. Hypertension can, therefore, also affect both supply and demand.[13] All other organs but most important to this discussion, the brain, heart, and kidneys depend on systemic pressure to maintain perfusion pressure. Therefore, it is inferred that certain patients such as with coronary artery disease, hypertension, raised intracranial, or intraocular pressure cannot tolerate the consequences of the hemodynamic response to laryngoscopy and intubation.[8]

Among the available β-adrenergic blocking drugs, esmolol appears to be an appropriate choice of agent for attenuating the hemodynamic response to laryngoscopy and tracheal intubation, due to its cardioselective property, rapid onset of action and short elimination half-life (9 min) along with the short elimination half-life and the rapid onset of action at the SA node of this drug. Therefore, it can be inferred that the lignocaine and esmolol both are effective in attenuating intubation response, but esmolol seems to be more effective than lignocaine in attenuating laryngoscopic and intubation response [Tables 2-5].

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group C (n=30)</th>
<th>Group L (n=30)</th>
<th>Group E (n=30)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>42.45±11.55</td>
<td>41.25±13.45</td>
<td>43.70±14.17</td>
<td>0.0003</td>
</tr>
<tr>
<td>Weight (in kg)</td>
<td>65.12±8.84</td>
<td>62.88±9.30</td>
<td>66.10±9.20</td>
<td>0.0091</td>
</tr>
<tr>
<td>Ratio (M:F)</td>
<td>16:14</td>
<td>16:12</td>
<td>16:14</td>
<td>0.895</td>
</tr>
<tr>
<td>ASA status (I/II)</td>
<td>8.22</td>
<td>12.18</td>
<td>14.16</td>
<td>-</td>
</tr>
<tr>
<td>MP grade (I/II)</td>
<td>20.10</td>
<td>20.10</td>
<td>17.13</td>
<td>-</td>
</tr>
<tr>
<td>Baseline SpO₂</td>
<td>99.47±0.48</td>
<td>99.54±0.37</td>
<td>99.63±0.55</td>
<td>0.425</td>
</tr>
</tbody>
</table>

Table 1: Distribution of patient's demographic profile

<table>
<thead>
<tr>
<th>HR (beats/min)</th>
<th>Group C</th>
<th>Group L</th>
<th>Group E</th>
<th>P value</th>
<th>Pairwise significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>81.40±5.67</td>
<td>79.50±5.30</td>
<td>80.47±5.28</td>
<td>0.4016</td>
<td>0.3675: 0.7846: 0.7681</td>
</tr>
<tr>
<td>1</td>
<td>113.23±5.80</td>
<td>90.57±5.41</td>
<td>85.37±5.51</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*: &lt;0.0001*: 0.0015</td>
</tr>
<tr>
<td>3</td>
<td>105.03±4.63</td>
<td>84.73±4.93</td>
<td>80.83±5.40</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*: &lt;0.0001*: 0.0091</td>
</tr>
<tr>
<td>5</td>
<td>93.87±5.08</td>
<td>80.47±4.65</td>
<td>75.03±5.80</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*: &lt;0.0001*: 0.0003</td>
</tr>
</tbody>
</table>

*Highly significant (test of significance used is ANOVA and post hoc Tukey test), HR: Heart rate
with no significant drug interaction with commonly used anesthetics.[14,15] Esmolol decreases the force of contraction and HR by blocking beta-adrenergic receptors of the sympathetic nervous system which are found in the heart, blood vessels, and other organs of the body. Esmolol prevents the action of two naturally occurring neurotransmitters epinephrine and norepinephrine, thereby attenuates the tachycardia and hypertensive responses to laryngoscopy and tracheal intubation. There have been several reports showing the effects of esmolol on both HR and arterial BP during laryngoscopy and ET intubation compared with placebo. Miller et al.16 in their study have reported that 100 mg of a single bolus dose of esmolol was effective for controlling the hemodynamic response to tracheal intubation in a Canadian multicenter trial. Liu et al. who used esmolol infusion to control hemodynamic responses associated with intubation, found significant decreases in HR and SAP before induction and post-intubation, the increase was 50% less in the esmolol-treated patients compared to the placebo group.[17] Korpinen et al. reported that the administration of bolus esmolol 2 mg/kg IV 2 min before laryngoscopy and intubation suppressed the increase in the HR rather than arterial BP.[18] Bostana and Eroglu reported that IV esmolol in dose of 1 mg/kg before intubation was effective in suppressing the HR and arterial BP.[19] Kumar et al. have also claimed optimal results while using higher doses of esmolol in Asian population, i.e., 2 mg/kg without any incidence of unplanned hypotension or bradycardia.[20]

Studies disagreeing to esmolol’s response on both tachycardia and hypertensive response following ET intubation are also available, namely, Oxorn et al. in their study concluded that esmolol in bolus doses of 100 mg and 200 mg affected solely the chronotropic response, i.e., it reduced the HR only significantly.[21] Kindler et al. found that esmolol administration before laryngoscopy was sufficient to control HR after intubation, but it did not affect SAP.[22] In our study, esmolol 2 mg/kg was found to be quite effective in attenuating the hypertensive response (MAP) as well as the HR during laryngoscopy and tracheal intubation till 5 min.

Lignocaine has been a popularly used agent for attenuating circulatory responses during intubation. The beneficial effect of lidocaine is due to its direct cardiac depression and peripheral vasodilation, ability to suppress airway reflexes due to irritation of tracheal mucosa, analgesic as well as antiarrhythmic properties. Abou-Madi et al. compared the efficacy of intravenous lidocaine 0.75 mg/kg and 1.5 mg/kg as protection against cardiovascular responses associated with laryngoscopy and endotracheal intubation.[23] These

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Table 3: Changes in hemodynamic variables (SBP) in control and experimental groups

<table>
<thead>
<tr>
<th>MAP (mm of Hg)</th>
<th>Group C</th>
<th>Group L</th>
<th>Group E</th>
<th>P value</th>
<th>Pairwise significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>127.07±7.80</td>
<td>129.73±8.82</td>
<td>128.07±8.11</td>
<td>0.4549</td>
<td>0.4284</td>
</tr>
<tr>
<td>1</td>
<td>161.13±6.08</td>
<td>137.60±8.74</td>
<td>132.27±7.75</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>3</td>
<td>145.33±5.87</td>
<td>132.87±8.75</td>
<td>127.67±8.51</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>5</td>
<td>139.60±4.94</td>
<td>128.07±8.87</td>
<td>121.80±7.59</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

*Highly significant (test of significance used is ANOVA and post hoc Tukey test). SBP: Systolic blood pressure

Table 4: Changes in hemodynamic variables (DBP) in control and experimental groups

<table>
<thead>
<tr>
<th>MAP (mm of Hg)</th>
<th>Group C</th>
<th>Group L</th>
<th>Group E</th>
<th>P value</th>
<th>Pairwise significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>77.40±6.84</td>
<td>78.37±4.91</td>
<td>75.87±5.26</td>
<td>0.2400</td>
<td>0.7898</td>
</tr>
<tr>
<td>1</td>
<td>92.32±6.11</td>
<td>84.67±5.12</td>
<td>80.33±5.26</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>3</td>
<td>89.13±5.64</td>
<td>82.67±5.22</td>
<td>76.47±5.16</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>5</td>
<td>85.67±5.33</td>
<td>77.33±5.02</td>
<td>72.53±4.66</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

DBP: Diastolic blood pressure. *Highly significant (test of significance used is ANOVA and post hoc Tukey test)

Table 5: Changes in hemodynamic variables (MAP) in control and experimental groups

<table>
<thead>
<tr>
<th>MAP (mm of Hg)</th>
<th>Group C</th>
<th>Group L</th>
<th>Group E</th>
<th>P value</th>
<th>Pairwise significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>92.73±6.36</td>
<td>95.70±5.25</td>
<td>94.27±5.73</td>
<td>0.1458</td>
<td>0.1222</td>
</tr>
<tr>
<td>1</td>
<td>115.57±5.14</td>
<td>101.87±5.76</td>
<td>97.33±5.40</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>3</td>
<td>109.47±5.97</td>
<td>98.83±5.53</td>
<td>94.27±5.69</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>5</td>
<td>104.37±5.51</td>
<td>93.80±5.58</td>
<td>89.47±5.18</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

MAP: Mean arterial pressure. *Highly significant (test of significance used is ANOVA and post hoc Tukey test)
researchers found that 1.5 mg/kg of lidocaine afforded complete protection against cardiac arrhythmias of all types; the lower dose was ineffective in preventing ventricular arrhythmias. The higher dose also offered “borderline” protection against a rise in HR and BP. The lower dose only prevented a rise in SBP. Lev and Rosen reviewed the use of prophylactic lignocaine as a pre-intubation medication. They used a dose of 1.5 mg/kg intravenously 3 min before intubation, and it was found to be optimal for attenuation of the sympathoadrenal pressure response to laryngoscopy and intubation without any harmful effects. Wilson et al. in their study stated that IV lignocaine is beneficial in preventing the hemodynamic changes to laryngoscopy and intubation. Bruder et al. in a review article wrote that in clinical practice, lignocaine is particularly effective in preventing the pressor response to tracheal intubation, whatever its route of administration (intravenous or intratracheal), but not the increase in HR.

However, recent studies have doubted the lignocaine’s efficacy. In studies by Singh et al. and Kindler et al., IV lignocaine 1.5 mg/kg was not found to be effective in controlling the acute hemodynamic response following laryngoscopy and intubation. Hence, we thought of modifying the dose to 2 mg/kg and found better results comparatively with no serious side effects. From the interpretation of the results of our study, we concluded that lignocaine (2 mg/kg) blunted the pressure response to laryngoscopy and intubation for a longer duration compared to previous studies with dose 1.5 mg/kg.

CONCLUSION

Intravenous lidocaine (2 mg/kg) and esmolol (2 mg/kg) are effective in attenuating the hemodynamic response to laryngoscopy and intubation for about 5 min without any deleterious effect. However, esmolol 2 mg/kg appears to be more effective and a potential agent for attenuating hemodynamic changes during induction of anesthesia.

REFERENCES

26. Bruder N, Ortega D, Grantl C. Consequences and prevention methods of

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Orthopedic, Clinical, and Paraclinical Resident Working Pattern in A Government Tertiary Care Hospital in Western India

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²Dean and Professor, Department of Orthopaedics, B. J. Government Medical College, Sassoon General Hospitals, Pune, Maharashtra, India,
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INTRODUCTION

India is a developing country with a billion plus population, most of which is underprivileged and poor. Majority of the population cannot afford the costly private medical health services and depend on the government health-care centers (PHC, rural hospitals, and district hospitals).

The government-run medical colleges and general hospitals provide the tertiary care for large section of the Indian public at a miniscule or else free of cost, these medical services are grossly underfunded and inadequate, understaffed, and overburdened.¹ Resident medical officer (1st, 2nd, and 3rd year postgraduates along with the interns) form the backbone of these institutions. In India, the working pattern of the resident doctors is not structured and varies from hospital to hospital with the absence of set working guidelines (duty hours).

Abstract

Background: In 2003, the Accreditation Council for Graduate Medical Education in the United States (US) had laid guidelines for resident doctor working hours, with Institute of Medicine setting further changes in 2010, with the sole aim of enhancing patient care. In India, no such guideline exists. They are a few dedicated studies of resident working pattern studying their stress levels, mental health, and other aspects. With overburdened understaffed government teaching hospitals and lack of facilities, resident doctors who form the backbone of patient care are overworked. With this background, we undertook this study at a tertiary care government hospital in Western India with the aim of understanding the working pattern of residents.

Materials and Methods: The study enrolled 38 residents. All these residents enrolled had Monday as emergency day. The residents included were from clinical and paraclinical specialties, and from the first, second, and third postgraduate years. These residents were followed for a week starting Monday to Sunday and a questionnaire was filled regarding their working hours, sleep duration, and eating pattern. Appropriate statistical test was applied.

Results: The results showed that the 1st year resident (junior resident) worked 114 h per week, slept for only 35 h per week, attended to 261 patients, and the continuous work at a stretch was 24 h (minimum - 19 to maximum - 30). The 2nd year (senior resident) and 3rd year (chief resident) residents had slightly more sleep hours and less working hours, however compared to the US and United Kingdom standards, the residents were overworked and underslept.

Conclusion: The study is a pilot study at a tertiary care hospital which shows that residents have inadequate sleep hours/week, excess working hours/week (>80 per week), along with other parameters as mentioned in results which directly affect patient care, thus suggesting setting guidelines for residents in India on lines of the United States, Europe.

Key words: Resident Medical Officer, Tertiary care center, Working pattern
developed nations of the west, namely, United States (US), United Kingdom (UK), and Switzerland have fixed set guidelines for the working of residents to enhance patient care with fixed duty hours which is absent in India.[1-3] There are some studies in India that describe stress in resident doctors,[3,4,10] but only few or no studies showing their working pattern,[1,2] therefore, we undertook this study at a premier tertiary care hospital in Western India with the aim of understanding the working pattern of a resident (1st, 2nd, and 3rd year in clinical and paraclinical specialty) over a busy week.

MATERIALS AND METHODS
The study was conducted at a premier tertiary level government hospital in Western India with bed strength of approximately 1300, with all specialties and super specialty departments and catering to the OPD of 3000 patients daily. The yearly intake of residents of all specialties is 550. All necessary ethics committee approval was taken. Our study involved only the clinical departments (Surgery, Medicine, Pediatrics, Orthopedics, ENT, Ophthalmology, Skin, Anesthesia, Chest and TB) and paraclinical departments (Pathology, Microbiology, PSM). The study involved data collection from all resident doctors who were in units having Monday as their emergency day. Monday was selected as it is the day having maximum OPD and IPD admissions in the hospital. All resident doctors of a unit having Monday emergency meant – 1st year residents (junior resident [JR]), 2nd year residents (senior resident [SR]), and 3rd year residents (chief resident [CR]) were enrolled. They were followed for 1-week period starting from Monday to Sunday for 24 h per day. Their information was filled daily on a preset questionnaire which included department, day, type of resident, day start 7 am to end 7 am next day, comorbidity, time of joining duty, end of duty, per day sleep hours, eating pattern (breakfast, lunch, and dinner), number of OPD patients seen, number of IPD patients seen, number of ICU patients seen, any illness/week, education timings (for residents, by residents), recreational activities, and duration.

This data were entered on Microsoft Excel sheet. The data were analyzed and appropriate statistical analysis done and test applied.

RESULTS
The average total duty work hours (TDW) for all the residents were maximum on Monday which was emergency day. On Monday, TDW hours for JR of all departments enrolled was 23.96 h, for SR it was 16 h, and for CR it was 19.6 h, which was also the continuous work at a stretch for the residents [Tables 1 and 2].

The average total sleep (TS) h on Monday for JR was 5 h, SR was 6 h, while CR was 5 h which was extremely low, the average for all other parameters studied like number of patient seen and calorie intake for all days of the week is mentioned in Tables 1 and 2.

The weekly parameters are mentioned in Table 3, for JR, the continuous work at a stretch was average 24 h (minimum 19 to maximum 30), sleep hours was 35 h per week, total work hours was 114. Furthermore, the patients seen were the week was 261 (IPD, OPD, and ICU).

<table>
<thead>
<tr>
<th>Table 1: Day wise pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents/days</td>
</tr>
<tr>
<td>Monday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
<tr>
<td>Tuesday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
<tr>
<td>Wednesday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
<tr>
<td>Thursday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Day wise pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents/days</td>
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<tr>
<td>Friday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
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<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
<tr>
<td>Saturday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
<tr>
<td>Sunday</td>
</tr>
<tr>
<td>TDW (h)</td>
</tr>
<tr>
<td>TS (h)</td>
</tr>
<tr>
<td>TPS (OPD, IPD, ICU)</td>
</tr>
<tr>
<td>Calories (cal)</td>
</tr>
</tbody>
</table>
Table 3: Weekly pattern

<table>
<thead>
<tr>
<th>Weekly</th>
<th>Continuous stretch work (minimum-maximum) in hours</th>
<th>Sleep (hours)</th>
<th>Total working (hours)</th>
<th>Total patients seen</th>
</tr>
</thead>
<tbody>
<tr>
<td>JR</td>
<td>24 (19–30)</td>
<td>35</td>
<td>114.1</td>
<td>261</td>
</tr>
<tr>
<td>SR</td>
<td>16.6 (6–22.5)</td>
<td>41</td>
<td>84</td>
<td>223</td>
</tr>
<tr>
<td>CR</td>
<td>20 (15–25)</td>
<td>40.7</td>
<td>89.3</td>
<td>233</td>
</tr>
</tbody>
</table>

JR: Junior resident, SR: Senior resident, CR: Chief resident

DISCUSSION

Health-care delivery in India comprises of public government hospitals and private clinics and hospitals. Majority of the population is poor and unafforded hence depends on government public health care which consists of PHC, Rural Hospitals, Government Medical Colleges and Hospitals for health care needs. These government hospitals provide all kinds of specialty and super specialty care. These hospitals cater to a large number of populations and are overburdened, understaffed, with poor infrastructure and machinery.\[1\]

The organizational culture among medical establishment is very hierarchical.\[11\] In these organizations residents form the backbone and entitled to do all the work, it is observed that they overworked. There are reports of widespread bullying going unreported.\[5,12\] Chronic shortage of physicians leads to extreme amounts of overwork and very high level of stress among residents.\[3\] There are very few studies documenting resident burnout in India. This high workload leads to poor performance and tendency to make mistakes which can be and are fatal in medical environment. There are countless cases of medical negligence being regularly reported and documented which can be traced to overwork. Considerate behavior is the least which is expected from the medical staff around him. However, the overworked and harried medical resident is not in such a position. This rude behavior toward patients is also a contributing cause of regular cases of violence toward the doctors by the patient attendants frequently reported in media.

The International Labour Organization recommendations prohibit more than 48 h of work each week since 1962.\[1,3\] Similarly, the EU rules allow for only a 48-h work week for a resident.\[14\] This was followed by major changes in National Health Service, UK. Even the factories act in the country provisions for payment of overtime and holidays for work. More than 48 h a week.\[13\]

In the US, the effect of residents’ long hours on performance was studied in the early 1970s, and as early as 1980–1981, the Accreditation Council for Graduate Medical Education (ACGME) Program Requirements for Graduate Medical Education in both Internal Medicine and Pediatrics included statements on a balance of education and service demands.

In February 1988, the recommendations of an ACGME task force on resident hours and supervision specified standards for all accredited programs that included: (1) 1 day in seven away from the hospital; (2) on-call duty in the hospital no more frequently than every third night; (3) adequate backup if sudden and unexpected patient care needs create resident fatigue sufficient to jeopardize patient care; and (4) institutional policies to ensure that all residents are adequately supervised, with reliable methods of communication between residents and supervising physicians. The Institute of Medicine set further guidelines in 1989, with regular upgradation in 1990s.\[16\] Although work hours and shift duration decreased somewhat for residents over the next decade, it was not until the goals of the patient safety movement aligned with research documenting a connection between fatigue and clinical performance that stronger regulations came into place. In 2003, the ACGME implemented rules limiting work hours for all residents, with the key components being that residents should work no more than 80 h per week or 24 consecutive hours on duty, should not be “on-call” more than every third night, and should have 1 day off per week. (Some fields, principally surgical specialties, received partial exemption from the regulations.) The ACGME’s current duty hour regulations went into effect in July 2011. These regulations maintained a maximum limit of 80 work hours per week but eliminated extended duration shifts (which have been linked to errors in prior studies) for 1st year residents, and strengthened oversight by senior physicians (by comparison, residents in many other countries work significantly fewer hours; the European Working Time Directive currently limits residents in Europe to no more than 48 h per week on duty).\[16–20\]

The Flexibility in Duty Hour Requirements for Surgical Trainees trial, published in 2015, randomized 118 general surgery residency programs to adhere to the 2011 ACGME regulations or to abide by more flexible rules that essentially followed the prior standard of a maximum 80 h workweek. The study found no significant differences in patient outcomes including death and serious complications.\[16,20\]

In India, there are few studies on resident doctor work, they highlight the stress pattern and prevalence of stress,\[1,3,4\] no study in India exists which shows the working pattern of resident doctors.
Hence, we undertook our study with the aim to know working pattern of resident doctor over a period of a week. Our findings showed that the 1st year resident (JR) worked 114 h per week, slept for only 35 h per week, attended to 261 patients, and the continuous work at a stretch was 24 h (minimum - 19 to maximum - 30). The 2nd year (SR) and 3rd year (CR) residents had slightly more sleep hours and less working hours, however compared to the US and UK standards, the residents were overworked and underslept. The JR attended to 261 patients/week (OPD, IPD, and ICU) put together and more than the SR and CR. With overwork and less sleep hours, it can directly affect patient care and personal health both mentally and physically as can be seen by their calorie intake. The results also show that although all residents are at risk, the 1st year residents are the susceptible group both mentally and physically and more needs to be done to increase their number and orientation and counseling so as to aim for their well-being.

Collier et al. showed that overall prevalence of provisionally diagnosed depressive and major depressive disorder in medical students was found to be 21.5% and 7.6%, respectively. Their results revealed that year of study and academic performance of medical students have a significant association with the prevalence of depression. 1st year students had the highest prevalence of depression followed by 2nd year students ($P < 0.001$). It was also observed that students with poor or excellent academic performance (based on the scores obtained in recent terminal or annual examinations) had higher rates of depression ($P < 0.05$). A study based in the US found 24% of medical students to be depressed. In another study in the US, 12% of medical students were diagnosed with probable major depression. In India, the prevalence of depression was around 39%.

Supe et al.,[24] Shah et al.[5] were studies in undergraduates students which evaluated the stress among the students. Ulmer et al., we conducted a prospective, controlled intervention of the effect of resident service census caps and unit-based admissions on residents’ workload, conference attendance, duty hour compliance, and patient safety census caps, and unit-based admissions were associated with improvements in resident workload, conference attendance, duty hour compliance, and readmission rates while patient outcomes were maintained. [19]

Levine et al. showed that a systematic review of the literature, we found that reduction or elimination of resident shifts exceeding 16 h led to improvements in resident quality of life (8/8 improved), improvements in patient safety and quality of care (7/11 improved; 4/7 unchanged; 0/7 worsened); and generally unchanged medical education (4/14 improved; 9/14 unchanged; 1/14 worsened). Under the ACGME standards, shifts of 24–30 h have remained the norm, but in the past 5 years, data have emerged strongly indicating that such extended shifts pose significant hazards for patients and residents. In this systematic review, we gathered together both published and unpublished data regarding programs that reduced or eliminated these extended shifts. While the precise nature of the changes made varied from one center to the next, all interventions included in our study either eliminated or reduced the frequency of shifts exceeding 16 h (extended shifts). Most led to improvements in patient safety and quality of life, without adverse educational consequences. This new evidence could be of value to policymakers and program directors as they seek to develop evidence-based work hour reforms. Further, data comparing specific approaches to eliminating or reducing extended shifts continue to be needed.[29]

The limitation of our study was the small sample size. Gulzer et al. suggested that there needs to be a recognition and awareness of the contribution of medical residents toward the cause of health care in the country. In view of our economy getting bigger, health care also needs a bigger contribution both in terms of the size of the pie but also as a percentage. Health care in the country is woefully underfunded and this state of affairs is unacceptable.[1]

**CONCLUSION**

Thus, with this we would like to suggest a more extensive study about resident working pattern and would suggest to set up a body to set working guidelines for the residents in the state and country, which will ensure safe, proper health care delivery and also give healthy and stress-free learning opportunity to budding doctors.

**REFERENCES**

8. Cohen JS, Patten S. Well-being in residency training: A survey examining...
resident physician satisfaction both within and out of residency training and mental health in Alberta. BMC (Medical Education) 2005;5:21-10.


21. Flexibility in Duty Hour Requirements for Surgical Trainees Trial - The FIRST Trial; 2017.


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Comparison of the Role of CT Angiography and DSA in Detecting Aneurysms in Cases with Spontaneous Subarachnoid Hemorrhage

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Abstract

Background and Purpose: Subarachnoid hemorrhage (SAH) due to rupture of aneurysms is one of the most alarming and catastrophic condition as it can cause significant morbidity and mortality and poses a formidable challenge both in its diagnosis and management. The present study is to compare the role of computed tomography (CT) angiography in detecting ruptured aneurysm with spontaneous SAH and the role of digital subtraction angiography (DSA).

Materials and Methods: During the period of 5 years from September 2012 to August 2017, patients presented with spontaneous SAH were studied. These patients underwent both 3D-computed tomography angiography (CTA) and 4-vessel cerebral DSA. CTA and DSA findings were evaluated and compared in terms of the existence of aneurysm, size, shape, number, location, and major vessel branching.

Results: Total 32 cases only 17 cases were positive with 19 aneurysms, 2 patients having 2 aneurysms each and 15 were negative. CTA has sensitivity of 89% in imaging aneurysms and in 86% of negative CTA cases DSA also negative for delineating aneurysm.

Conclusion: CTA is a good procedure with a sensitivity of 89% in the detection and delineation of cerebral aneurysms. Owing to the lower specificity of CTA in some cases, DSA remains the gold standard in evaluating patients with cerebral aneurysms. In complex aneurysms, DSA supplements CTA images in planning their management.

Key words: Computerized tomography angiography, Digital subtraction angiography, Intracranial aneurysms, Subarachnoid hemorrhage

INTRODUCTION

Subarachnoid hemorrhage (SAH) due to rupture of aneurysms is one of the most alarming and catastrophic conditions as it can cause significant morbidity and mortality and poses a formidable challenge both in its diagnosis and management. The earliest reference about SAH was found in Avicenna’s records (980–1037 AD) where he describes ‘‘apoplexy due to sanguineous tumor effusing suddenly about the ventricles.’’ Morgagni (1682–1771) gave the first description of aneurysm as the cause of SAH. The incidence of SAH is reportedly 6–10.9/100,000.¹,² In India, though initially reported low, the numbers have been increasing steadily.

An autopsy series found 21% of SAH due to aneurysms in the cerebral vasculature. While the clinical entity of SAH was known, its cause remained an enigma for long as diagnostic methods were not available. Quincke ushered in a new era in the diagnosis of SAH with his lumbar puncture procedure in 1891. Egaz Moniz in 1927 developed the technique of cerebral angiography. In 1933, he demonstrated an aneurysm in a living patient. This anatomical localization of the cause of SAH by
angiography helped to move the treatment of SAH from medical to the surgical mode and presently the evolving field of endovascular therapy. The 20th century saw the evolution of newer imaging modalities, namely, computerised tomography (CT), magnetic resonance imaging, and digital subtraction angiography (DSA). This study attempts to compare the use of CT angiography (CTA) in the diagnosis of cerebral aneurysms with DSA in CTA negative cases.

Significant morbidity and mortality occur due to the first bleeding or repetitive bleeding.[3,4] For this reason, fast and accurate evaluation of the patients is of great importance in planning the therapeutic interventions. CTA is a faster and a more easily applied method as compared to DSA. Another advantage of CTA is its applicability following routine non-enhanced cranial CT in patients with suspected SAH in emergency conditions. DSA is invasive, time-consuming and expensive.[5] In this study, we aimed to compare the effectiveness of CTA to DSA in diagnosis and evaluation of intracranial aneurysms in cases with spontaneous SAH. The presence of an aneurysm, its location, number, size, shape, and orientation were studied in both the imaging modalities.

**MATERIALS AND METHODS**

During the period of September 2012–August 2017, 32 patients admitted with spontaneous SAH in King George Hospital, Andhra Medical College, Visakhapatnam underwent 3D-CTA and 4-vessel cerebral DSA in CTA negative and doubtful cases. These patients reported with spontaneous SAH and had a high index of suspicion of harboring an aneurysm. All the patients were assessed clinically based on the Glasgow coma scale (GCS) and the World Federation of Neurosurgical Societies (WFNS) scale at the time of admission. Out of 32 patients 4 patients presented with GCS score of 15 WFNS Grade 1, 2 patients presented with GCS 14 with no motor deficit WFNS Grade 2, 22 patients presented with GCS 13 or 14 with focal deficits WFNS Grade 3, 2 patients presented with GCS 12 and 8 with focal deficit WFNS Grade 4, and 2 patients presented with GCS 5 with deficit WFNS Grade 5.

Patients were immediately subjected to CTA at the time of admission, and if CTA is negative, the DSA was taken on the next day to 3 days depending on the general condition of the patient. If DSA is also negative, then CTA and DSA were repeated after 1–3 months interval depending on patient condition and amount of suspicion of harboring an aneurysm. The liver and renal function tests were done along with an echocardiogram to assess the cardiac status of the patients. These tests were done as high doses of contrast was administered rapidly which requires good left ventricular function, liver and renal function to metabolize and excrete the contrast.

16 slice CT of GE Health Care was used in all the cases with Iohexol (Omnipaque) as intravenous contrast. Image processing consisted of standardized axial, coronal, sagittal, multiplanar, and 3D reconstructions were taken.

DSA was performed using a neuroangiography unit of GE Medical Systems with 4-vessel study with standard Towne and lateral views as well as rotational spin angiograms. The dye used is Iohexol (Omnipaque) as intravenous contrast.

Out of 32 patients, 19 are male with ages from 26 to 72 and 13 are female with age range from 31 to 81.

CTA which is faster and easily applied was carried out in all the patients with SAH. DSA positive cases in initial CTA negative were studied. No complications were encountered during DSA procedures. CTA and DSA negative cases were followed and in cases where there is strong suspicion of harboring a ruptured aneurysm, repeat CTA was done during the follow-up period ranging from 1 to 3 months. Again, DSA was repeated in negative CTA cases during follow-up [Figure 1].

**RESULTS**

The data from this study have been analyzed under the parameters such as clinical presentation, findings on CT scan with grading, findings of CTA, findings of DSA in CTA negative cases, and results of repeat CTA/DSA during follow-up.

Of the 32 patients who presented with spontaneous SAH, there was a history of a severe headache in 29 patients and in 3 patients presented in unconscious state, patient attendants could not give history of complaining headache before illness. Focal deficits are seen in 18 patients. 4 patients presented with loss of consciousness, 4 patients presented with symptoms of raised intracranial pressure and seizures in 1 patient. In 24 patients, there was a history of chronic, episodic headache.

According to modified Fisher grading out of the 32 patients, 13 patients were presented in Grade 1, 9 in Grade 2, 6 in Grade 3, and 4 Grade 4.

Of the 32 patients who underwent CTA, 17 aneurysms were seen in 15 patients. Among these 15 patients, 2 patients were having 2 aneurysms each, in which one patient had middle carotid artery (MCA) and basilar tip aneurysms and in the other ICA and DACA aneurysms were seen. Out of
17 aneurysms, 7 are AcomA, 3 MCA, 2 PCOM, 2 ICA, 2 basilar tip, and 1 DACA. All the negative CTA patients are subjected to DSA in 1–3 days after initial SAH and 4 of CTA positive patients were also subjected to DSA for detailed study of aneurysm and major vessel branching visualization. In CTA negative patients, DSA could detect aneurysm in 2 patients 1 DACA and 1 ICA. Retrospectively ICA aneurysm could also be made out in CTA. Out of 4 patients with CTA positive cases, DSA could give additional imaging findings to help the treatment plan in 3 cases. DSA depicted two lobes of the AcomA aneurysm where CTA showed only one lobe [Figure 2]. For one PCOM aneurysm delineated in CTA, DSA could detect the branching of major vessel from aneurysm. For MCA aneurysm in CTA, the neck could not be seen clearly which is with wide neck and incorporating major branches as seen in DSA [Figure 3].

Of 15 patients where there is strong suspicion of aneurysm because of perimesencephalic and diffuse type of SAH with initial CTA and DSA were negative, repeat CTA and DSA were done in the follow-up period 1–3 months, and only two cases showed blister aneurysms on DSA and CTA remained negative in all [Figure 4]. Several studies like Ogawa et al., JKA Hope have demonstrated the sensitivity of CTA of nearly 90%[6,7] while in this study the sensitivity was 89%.

The close proximity of supraclinoid, cavernous and ophthalmic segment aneurysms to bony structures pose difficulty in their identification in CTA and such difficulties has been reported in literature.[8]

Furthermore, CTA missed one lobe of aneurysm of AcomA, the reason for which remains obscure. CTA image of PCOM aneurysm and MCA aneurysm yielded inferior results as comparable to those of DSA in relation to adjacent major branching pattern.

![Figure 2: Case 2 – (a) Anterior interhemispheric subarachnoid hemorrhage, (b) computerized tomography angiography with AcomA aneurysm single lobe, (c) digital subtraction angiography showing bilobed AcomA aneurysm](image)

![Figure 3: Case 3 – (a) Perimesencephalic subarachnoid hemorrhage, (b) 3 D computerized tomography angiography right PCOM aneurysm, (c) digital subtraction angiography showing right PCOM incorporating the neck of aneurysm](image)
Another feature of SAH, namely, vasospasm is not evident on CTA. In the characterization of complex large aneurysms, CTA images were inferior with DSA in revealing the location, projection and its relationship with adjacent arteries. No cases of cerebral vasculitis on DSA imaging were seen.

DISCUSSION

Due to high mortality and morbidity rates associated with spontaneous SAH, early diagnosis and anatomic characterization of ruptured aneurysms have a vital importance for both surgical and endovascular treatment options. CTA is a highly accurate, cheap and non-invasive imaging method in the diagnosis of intracranial aneurysms in cases with SAH and can be used as a safe method when emergency surgery is needed. DSA is universally accepted as the gold standard imaging modality in the diagnosis and evaluation of aneurysms. In our study, we have done DSA for all CTA negative cases. DSA is a time consuming, an expensive and invasive procedure that may lead to complications in 1% and permanent neurologic deficit in 0.5% according to literature. No complications were seen in our study during DSA.

Depending on different studies in the literature, it was reported that the sensitivity of CTA in diagnosing intracranial aneurysms ranges between 67% and 100%. In our present study, CTA sensitivity is 89%.

Lenhart et al. stated that CTA had supplied additional information to DSA in their study that had found the sensitivity of CTA as 98%. White et al., in their research of 142 cases published in 2001, had found CTA sensitivity as 69% and specificity as 80% in detection of intracranial aneurysms.[6] Ogawa et al. reported that they had visualized 73 aneurysms with shaded surface display and the sensitivity of CTA was 94% in detection of aneurysms.[6] CTA sensitivity was reported to be 100% by Preda et al. in 1998 and Matsumoto et al.[13]

Aneurysm size is an important factor in planning surgical or endovascular treatment because it affects the size of the clip or coil that is going to be used. Alberico et al. reported that CTA and DSA have no significant difference in measurement of aneurysm sizes.[13] In our study mean aneurysm size measured by CTA is 5.2 and DSA is 5.7 had no statistically significant difference.

Due to the low spatial resolution in CTA, small arteries that are important for the surgical approach, such as anterior choroidal artery or thalamoperforator arteries cannot be visualized. CTA cannot demonstrate the collateral flow that can be evaluated by DSA. Differentiation of small aneurysms from bone that are located near the bony structures at the skull base such as posterior communicating artery and basilar artery may not be possible in some cases. Cavernous segment aneurysms of ICA may be obscured by opacified blood in the cavernous sinus. Small aneurysms located at bifurcation of MCA may be overlooked by CTA due to branching of the vascular structure. All these were encountered in our present study.

Out of 19 aneurysms in the present study, 17 could be imaged in CTA and 14 aneurysms intervention could be carried out with the findings on CTA. In 3 aneurysms additional imaging findings on DSA could help our treatment plan. 2 aneurysms were detected in DSA with negative CTA. CTA has sensitivity of 89% in imaging aneurysms and in 86% of negative CTA cases DSA also negative for delineating aneurysm. Thus, in 86% of cases, a negative CTA could rule out the presence of aneurysm. Of 15 patients where there is strong suspicion of aneurysm due to perimesencephalic and diffuse type of bleed with initial CTA and DSA were negative, repeat CTA and DSA were done in the follow-up period 1–3 months, only two cases showed blister aneurysms on DSA and CTA remained negative in all.

In the study of Rinkel et al.[16] the cause of Perimesencephalic hemorrhage (PMH) is likely not aneurysmal but may be venous, and the patients have no risk of rebleed.[17] Thus, Rinkel et al. have stated that patients with PMH do not need a repeat DSA after initial negative findings on DSA.[17] They also suggested that DSA is not needed at all in patients with PMH who had negative CTA findings.[18]

In the study of Kershenovich et al.[19] they retrospectively evaluated 30 patients with a perimesencephalic SAH pattern.
and a negative CTA finding. DSA findings were negative in all of these patients. They concluded that CTA alone is a conclusive diagnostic tool for ruling out aneurysms in patients presenting with the classic perimesencephalic SAH pattern and thus can replace DSA.

In summary, CTA is a highly sensitive, specific, fast, and non-invasive imaging method for diagnosis and evaluation of aneurysms in cases with spontaneous SAH with suspected intracranial aneurysms. CTA should be the first line of the investigation. A negative CTA finding with SAH pattern of aneurysmal rupture, DSA is indicated. In complex aneurysms, DSA supplements CTA images in planning the management decision between surgical clipping and endovascular coiling.

CONCLUSION

CTA is the first line imaging technique for the patients presented with spontaneous SAH in most of the cases with a sensitivity of 89% in the detection and delineation of cerebral aneurysms. DSA remains the gold standard in evaluating patients with cerebral aneurysms where the initial CTA is negative. In complex aneurysms, DSA supplements CTA images in planning the management decision between surgical clipping and endovascular coiling.

REFERENCES


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Correlation of Posterior Tibial Slope with Metaphysio-diaphyseal Angle in Total Knee Arthroplasty: A Radiological Study

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Abstract

Background: Posterior tibial slope (PTS) is an important factor affecting post-operative range of motion following total knee arthroplasty (TKA). Metaphysio-diaphyseal angle (MDA) is a new entity defined as the angle between proximal anatomical axis and metaphyseal axis of tibia. This study was undertaken to determine PTS in Indian patients and find its correlation with MDA of tibia. The accuracy of extramedullary jigs and the influence of MDA on the accuracy was also evaluated.

Materials and Methods: Data of 100 consecutive patients undergoing TKA in a single center by a single surgeon were analyzed. Posterior cruciate ligament substituting TKA was done with the same jig to achieve different PTS in different patients. MDA, pre-operative PTS, and post-operative PTS were calculated. The data were analyzed using appropriate statistical analysis.

Results: Mean pre-operative PTS was 11.64° and mean MDA was 23.76° with a strong correlation between them (Pearson’s coefficient 0.72). Extramedullary jigs were accurate in 53% of cases. In remaining 47%, post-operative PTS was less than planned PTS in 30%, and more in 17%. Mean post-operative PTS was 2.54°. In patients with MDA < 20°, post-operative PTS was significantly less ($P = 0.0176$) compared with those with MDA > 20°.

Conclusions: The study establishes the positive correlation between MDA and PTS in Indians; and that MDA is an independent factor affecting the accuracy of extramedullary jigs in TKA.

Key words: Arthroplasty, Metaphysio-diaphyseal angle, Posterior tibial slope

INTRODUCTION

The proximal tibial end is in the form of a plateau with which the femur bone articulates and forms the knee joint. The tibial plateau is not exactly flat but has a slope toward the posterior direction. This posterior inclination of the tibial plateau relative to the longitudinal axis of the tibia is referred to as the posterior tibial slope (PTS).

The PTS plays a very important role in the kinematics and biomechanics of the knee joint. It has been shown that increasing PTS increases the tibial shear force and anterior tibial translation at the knee.[1]

The PTS of various populations has not been completely mapped out at present, but reports suggest a high range from 0° to 18° depending on age, gender, race, genetics, and various diseases and morbidities.[1,2] The PTS of the tibia has been assessed using various methods ranging from direct cadaveric measurements and radiographs to computed tomography (CT) scans and magnetic resonance imaging (MRI).[3]

The patients require an average flexion of 67° for swing phase of gait, 83° for climbing stairs, 90° for descending stairs, and 93° to rise from a seated position.[4,5] In the eastern hemisphere and in the Indian subcontinent, flexion >105° is required for kneeling and squatting during activities of daily living and religious activities.[6]

Among the numerous factors affecting the flexion in the knee, PTS is important, which decides about the sagittal alignment of the tibia.[3] Studies done in the Chinese, Japanese, and Pakistani populations (Asians) have documented a difference in the PTS in their respective
population from the Caucasians, which is responsible for differences in the range of flexion in these populations.\textsuperscript{[\textsuperscript{7},\textsuperscript{9}]}\textsuperscript{[7]}

Osteoarthritis leads to decrease in range of motion (ROM), one of the reasons due to altered PTS. Total knee arthroplasty (TKA) is one of the most successful operations, done to achieve improved ROM and pain relief with the attainment of optimum PTS, with an average survival of more than 90% at 15 years.\textsuperscript{[10,\textsuperscript{11}]}\textsuperscript{[10,11]} In TKA, for the achievement of the desired PTS and thus increased ROM, tibial cut is made with the help of extramedullary jig which is based on the anterior tibial line as a reference.

Metaphysio-diaphyseal angle (MDA) is a new concept, and its role in affecting the TKA is under study and research.

The present study is undertaken to study the PTS in patients undergoing knee joint arthroplasty and to study the role of MDA in achieving desired PTS in TKA using extramedullary jig.

**Aims and Objectives**

The aims and objectives of the present study are as follows:

1. To find the mean PTS and MDA in patients planned for total knee replacement.
2. To find a correlation between desired PTS, the MDA, and post-operative PTS achieved.

**REVIEW OF LITERATURE**

Whereas the normal PTS has been quoted as 5–10°, racial differences in the PTS have been found. PTS is an important factor affecting post-operative ROM following TKA.

There is a significant correlation between the PTS and the MDA directly.\textsuperscript{[4]}\textsuperscript{[4]} Thus, for achieving the desired PTS, MDA should be considered during the planning of a total knee replacement of knee.

Hofmann \textit{et al.}\textsuperscript{[12]} found that tibiae cut parallel to the surface exhibited 40% greater load carrying capacity and 70% greater stiffness than paired tibiae cut perpendicular to the long axis.

Bartel \textit{et al.}\textsuperscript{[13]} suggested that, when the stiffest and strongest cortical bone is removed, the remaining weaker and less stiff cancellous bone stock often is inadequate to support the physiologic loads of the knee.

Chiu \textit{et al.}\textsuperscript{[8]} studied the posterior slope of the tibial plateau in 25 pairs of Chinese cadaveric tibia and found a good agreement between the PTS measured on radiographs and the actual tibial slope measured on cadaveric tibia. With radiographic measurement, the posterior slope was 11.5° using intramedullary method, and it was 14.7° using extramedullary method and also concluded that osteoarthritis increases the slope by 2–3°.

Bai \textit{et al.}\textsuperscript{[14]} noted that anteriorly sloped tibial components led to a tendency to posterior micromotion and thus more wear of implant in TKA.

Turgut \textit{et al.} and Waelchli \textit{et al.}\textsuperscript{[15,16]} noted that the posterior slope of the tibial cut affects anteroposterior stability, ROM, and contact pressure within the tibiofemoral joint.

Yoga \textit{et al.}\textsuperscript{[17]} found that the posterior slope of the tibial plateau is an important feature to preserve during knee replacement. The correct slope aids in the amount of flexion and determines if the knee will be loose on flexion. This study on the posterior tibial plateau slope was based on pre- and post-operative radiographs of 100 consecutive patients who had total knee replacements. The average posterior slope of the tibial plateau was 10.1°. There is a tendency for patients with higher pre-operative posterior tibial plateau slope to have higher post-operative posterior tibial plate slope.

Kettelkamp DB \textit{et al.}\textsuperscript{[4]} (2010) in a study on 40 males and 19 females in Pakistan found that the PTS was greater in women than men (14.1° vs. 12.5°, \textit{P} = 0.02) and was greater than the range of 5–10° commonly reported in western literature. They concluded that the greater PTS in Pakistanis suggests that a proximal tibial cut with a greater PTS may reduce the chance of tibial loosening and increase post-operative knee ROM, especially when using posterior cruciate ligament (PCL)-retaining designs.

Yoo \textit{et al.}\textsuperscript{[9]} quoted that there was no consensus on an ideal anatomical reference to determine the posterior slope of tibia plateau. Posterior slope of the medial tibia plateau was measured with reference to a proposed mechanical axis (MA) and 5 clinically relevant anatomical references in 90 osteoarthritic knees of 66 female patients undergoing TKA. The MA was defined as the line connecting the midpoints of the medial tibia plateau and the tibial plafond, and 5 anatomical references included the anterior cortical line of tibia, anatomical axis of proximal and central tibia, posterior cortical line of proximal tibia, and fibular shaft axis (FSA). The average posterior slope was 10.6° with reference to the MA, and the amount of posterior slope varied widely among the patients and depending on the anatomical reference used to measure. This study indicated that the anatomical reference used to measure the posterior slope should be identified in studies where posterior slope is used to evaluate the sagittal alignment of TKA.
Didia and Jaja\textsuperscript{[18]} performed a radiological study on 212 lateral tibial radiographs of Nigerian population measuring PTS with reference to the anterior tibial cortex and found a mean PTS of 12.3°.

Mohanty et al.\textsuperscript{[71]} in a study of 100 cases concluded a positive correlation between MDA and PTS; and that MDA is an independent factor affecting the accuracy of extramedullary jigs in TKA.

Dargel et al.\textsuperscript{[19]} studied 60 human cadaver knees and concluded that male linear knee joint dimensions were significantly larger when compared with females but the difference was not significant, and hence, there was no need for gender-specific implant design or technique to be employed in TKA.

Bek\textsuperscript{[20]} concluded that, although different extramedullary tibial cutting guides with and without a spike can reproducibly impart a desired PTS in TKA, the spiked guide was user-friendly.

It appears that the MDA determines the MA in the sagittal plane because it brings the center of the knee backward. Therefore, it is susceptible to increase the difference between the anatomical axis obtained from an extramedullary jig (aligned on the diaphysis and the anterior cortical line) and the MA: The greater the MDA, the greater the difference between the diaphyseal axis and the MA in the sagittal plane.

**MATERIAL AND METHODS**

This study was conducted in the Department of Orthopaedics, Index hospital, Indore, Madhya Pradesh, India. Permission was obtained from the departmental scientific committee and the Institutional Ethical Committee at the beginning of the study.

The study duration was from August 2015 to September 2017. The sample size for the study was of “30 knees” as discussed by the statistician.

**The Inclusion Criteria were as Follows**

1. All patients who underwent primary TKA during the period of the study, Index hospital, Indore.
2. Use of extramedullary spiked jig to cut tibia intraoperatively.

**The Exclusion Criteria were as Follows**

1. Patients not willing to be a part of the study.
2. Patients with complex primary total knee replacement ROM <50°, angular deformity >10°, FFD >30°, and associated neurovascular disease.
3. Patients with BMI >40.
4. Revision TKA.
5. Patients previously operated around knee joint.
6. Patients with extra-articular deformity.
7. Bone defects requiring build on tibia.

The patients for planned TKA were admitted a few days before surgery. Patients were given informed about the study through the “patient information document” in their own language (Hindi/English). Those who gave a valid written consent were enrolled in the study. Pre-operative assessment as per the pre-decided detailed pro forma was done which will include history taking, examination, investigations, and X-rays lateral and anteroposterior views.

Full weight bearing standard radiographs were taken in both anteroposterior and lateral views not more than 1 week before the date of replacement surgery. Lateral views were taken with both the tibia and femoral condyles overlapping with at least 15 cm of the shaft of tibia visible for calculation of the anatomical axes.

Pre-operative PTS and MDA were calculated as mentioned as follows. All the measurements were carried out manually by the principal investigator under the supervision of the guide and coguide of this study, using radiographs, goniometer, and markers.

Pre-operative PTS [Figure 1] was defined as the angle formed by two lines in the lateral radiograph. The first line was the line perpendicular to the anatomical axis of the proximal tibia proximal tibial anatomical axis (PTAA). The second line formed by joining the most proximal points on the tibial plateau on the lateral radiograph as defined by Massin et al.,\textsuperscript{[21]} avoiding osteophytes.

The PTAA, i.e., the line connecting midpoints of outer cortical diameter at 5 and 15 cm distal to the knee joint (Yoo et al.), is now recommended because it is most parallel to the sagittal MA. Hence, this axis was assumed to be the tibial anatomical axis in our study.

**MDA**

MDA [Figure 1] is angle which is formed between two lines: The first line is the proximal anatomical axis of the tibia which is drawn by connecting midpoints of outer cortical diameter of tibia at 5 and 15 cm distal to the knee joint. The second is the axis of the metaphysis, drawn by defining two points each on anterior and posterior cortices of tibial metaphysis in a lateral film and joining the midpoints. Finally, the angle between these two lines is MDA.

The patients were operated by their respective surgeon using PCL substituting design of implant using spiked extramedullary tibial jig on tibial plateau [Figures 2 and 3].
All patients underwent total knee replacement under tourniquet under spinal anesthesia in the supine position by mid parapatellar approach. After sterile painting and drapping, midline linear anterior incision was made and anteromedial arthrotomy done. Medial release is done, and patella was everted. Menisci were cut and removed. The external jig had an inbuilt slope of 3°.

The jig was aligned by the surgeon as per his judgment to achieve the optimum post-operative PTS. As the general guideline followed in our institute, the desired post-operative PTS was in a range from 0° to 7°. The surgical team was blind for the pre-operative PTS and MDA of the patient calculated for this study.

Primary tibial cut is made with desired PTS, and primary femoral portal is made 1 cm above PCL attachment. Using 5° valgus, primary femoral cut made at 9 mm from distal articular surface. Extension gap is checked and measured. Femur is sized with anterior referencing jig and 3° external rotation marker. Using appropriate size of femoral cutting block, cuts, chamfers, and notch are made. Flexion and extension gap is checked with appropriate spacer. Tibia sizing done and keel is prepared. Flexion, extension, and mid flexion mediolateral stability is checked. Appropriate-sized implant fixation is done with cementing after trial. Closure is done in layers over a suction drain. Sterile compression dressing is applied. Physiotherapy is started at the suitable time.

Post-operative X-rays are recorded at day 2 and alignment of the implant is checked. Suture removal is done on post-operative day 14. The patients were followed in OPD at regular intervals as per routine protocol. X rays were done at each visit and post-operative PTS (post-operative PTS) calculated from lateral radiograph shot at post-operative day 2-week follow-up.

**Post-operative PTS**

In the post-operative radiograph, the PTS [Figure 5] was calculated by joining two lines. The first line was the line perpendicular to anatomical axis of tibia. The second line is formed by joining the two most proximal points anteriorly and posteriorly along the tibial component of the implant.

Final correlation between PTS, MDA, and post-operative PTS was calculated using appropriate statistical calculations.

**Observations**

A total of 32 knees were enrolled in this study of which 2 knees were excluded as one required tibial build up and one knee underwent unicompartmental knee arthroplasty.

The remaining 30 knees belonged to 21 patients. 12 patients had total knee replacement of one knee only, whereas the remaining 9 patients underwent bilateral total knee replacement in Index hospital, Indore.
RESULTS

Age Distribution
The average age of the patients was 56 years (range 39–70 years).

Gender Variation
66% knees belonged to female patients, whereas remaining 10 knees were of male patients.

Table 1: Pre-operative PTS, MDA, and post-operative PTS of case 1

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<th>Pre-operative</th>
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<td>PTS</td>
<td>21°</td>
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Table 2: Pre-operative PTS, MDA, and post-operative PTS of case 2

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<th>Pre-operative</th>
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<tr>
<td>PTS</td>
<td>14°</td>
<td>27°</td>
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PTS: Posterior tibial slope, MDA: Metaphysio-diaphyseal angle
The mean PTS for male knees (n = 10) was 13.3° (9°–21°), and the mean MDA was 19.5° (16°–25°).
Mean pre-operative PTS for female patients was 13.45° (6–19), and the mean MDA was 20.45° (11°–27°).

Laterality
63.33% knees were left sided (n = 19), while the reaming were 11 knees were right sided (36.66%).

The mean PTS for right-sided knees (n = 11) was 12.54° (8°–18°), and the mean MDA was 20.27° (11°–27°). The mean PTS for left-sided knees (n = 19) was 13.89° (6°–21°), and the mean MDA was 20.05° (15°–25°).

Pre-operative PTS and MDA
The mean pre-operative PTS of the study sample was 13.40° with a standard deviation of 3.67°. The mean MDA
was of the study sample was 20.13° with standard deviation of 3.92°. The mean post-operative PTS was 12.86° with a standard deviation of 5.82°.

Dividing Sample into Two Groups
The median of MDA was 19°. Hence, to evaluate the role of MDA on post-operative PTS, the sample was divided into two groups.

Group A with MDA ≤19°.
Group B with MDA more than 19°.

The mean pre-operative PTS of Group A was 11.06° (6–15), whereas mean pre-operative PTS of Group B was 16.07 (11–21°).

The mean post-operative PTS of Group A (n = 14) was found to be 7.68° (1°–13°), whereas mean post-operative PTS of Group B was 12.57° (8°–17°).

Statistical Analysis
The data obtained from the study as various angles were subjected to statistical analysis with the assistance of the statistician in the Department of Preventive and Social Medicine, Index Medical College, Indore.

Appropriate statistical analyses were applied depending on the distribution of the data with Microsoft Excel software. The data were quantitative and normally distributed.

Correlation of PTS with age
There was no correlation between age and any of the three variables noted in the study. The variation in the angles was independent of the age of the patients.

Correlation between PTS and MDA
As the data were quantitative and normally distributed with n > 30, Pearson’s correlation coefficient was used to define the correlation between PTS and MDA.
There is a strong positive correlation between pre-operative PTS and MDA with Pearson's coefficient of \( r = 0.7364 \).

**Significance of difference of pre-operative PTS and post-operative PTS in two groups of MDA**

For comparing two groups defined on the basis of MDA, student's unpaired \( t \)-test was used with an alpha level of 0.05 and beta 0.2, that is, power (1-beta) of 80%.

While comparing pre-operative PTS for Group A and Group B (via unpaired \( t \)-test), the \( t = -5.94479 \). The \( P < 0.00001 \), and hence, the result was statistically significant at \( P < 0.05 \). Furthermore, on comparing post-operative PTS for Group A and Group B (via unpaired \( t \)-test), the \( t = 4.33324 \). The \( P = 0.000098 \). The result is significant at \( P < 0.05 \).

Hence, the pre-operative PTS as well as post-operative PTS in the group A (MDA \( \leq 19^\circ \)) was significantly less than Group B (MDA \( > 19^\circ \)) (Figures 4, 6-13, (Graphs 1-9) and (Tables 1-7).

**DISCUSSION**

The PTS has been assessed using various methods, ranging from direct cadaveric measurements to CT scans and MRI. However, radiographic calculation is most often used in developing countries due to financial constraints. Even with radiographs, various methods of assessment have been described.

Brazier et al.[13] described the different anatomical axes against which the PTS could be measured. The lines included the tibial proximal anatomical axis (TPAA), tibial shaft anatomical axis (TSAA), posterior tibial cortex (PTC), anterior tibial cortex (ATC), fibular proximal anatomical axis (FPAA), and FSA. They concluded that, among the proximal axes, the TPAA and PTC gave higher reliability. The ideal way to measure the PTS is against the anatomical axis of the tibia Shaft (TSAA). This will require a radiograph of the at least half of the tibia which is usually not taken routinely in clinical practice. The TPAA does not exactly match the MA of the tibia but gives a close correlation.

The normal values for the posterior tibial plateau slope have not been fully mapped out for all populations. However, what is reported show a high variability between races and ranges from 0° to 18°. Whereas, the normal PTS has been quoted as 5-10°; racial differences in the PTS have been found.[6,8,10] In this study, we found the pre-operative PTS slope varied from 6 to 21 averaging 13.4°. These values are similar to the values reported in the literature by Mohanty et al.[10] in Indian population (11.64°), Khattak et al.[7] in Pakistani population (12.5° in males and 14.2° in females), Yoo[9] in the Japanese population (10.6°), and Chiu et al.[9] in the Chinese population (13.1° in osteoarthritic knees and 10.8° in normal knees on radiographs).

Asian population has been found to have an increased PTS as compared with Caucasian population. Moreover, it has been found that the PTS increases with the onset of osteoarthritis.[5,13,14] At the same time, some other authors have reported lower PTSs in the Asian population.[13,22] These variations in the PTS reported in the same population may be due to the difference in the reference axis and the methodology used in the calculation of the PTS.

This study noted NO significant correlation between age of the patients and their knee’s pre-operative PTS. Furthermore, NO significant difference was noted for the side of the body to which the knee belonged.

As was noted in Yoga et al.[17] and a systematic review by Merchant et al.,[25] the slope was nearly equal in males and females in this study. This was in accordance to the study of 60 cadaveric knees by Dargel et al. where they observed that although the male dimensions of knee are larger than their female counterparts, when adjusted for patients’ height and femoral length and on matched pair analysis, there is no significant difference in the morphometric variables in male and female sex. However, Khattak et al.[14] and Didia and Jaja.[18] did find a significant difference in the PTSs between the two sexes.

It was postulated in this study that the MDA might affect the PTS and hence affect the overall sagittal alignment of the proximal tibia. It was also hypothesized that high MDAs could potentially lead surgeons to overestimate the PTS using extramedullary jigs and that it would require a substantial correction depending on the native MDA and PTS.

In this study, a strong Pearson’s coefficient of correlation of 0.737 was found between the pre-operative PTS and MDA which emphasizes the same school of thought. The previous studies have noted that MDA affects the MA in the sagittal plane because it brings the center of the knee backward.

The surgeons desired a post-operative PTS within 0°–7° in all cases. MDA had no effect on the desired PTS, the post-operative PTS of Group A and Group B should have been nearly same, and statistically, no significant difference should have been noted. However, the post-operative slope of Group A and Group B was 7.86° and 12.57°, respectively, and a significant difference was noted among them (via unpaired \( t \)-test). This strongly suggests that, in patients with high MDA (\( > 19^\circ \) in this study), the achieved PTS is higher than desired PTS.
It was noted that the MDA affects the accuracy of the extramedullary jig used for achieving the PTS intraoperatively. The variation in the achieved PTS could be explained by the altered proximal tibial anatomy due to different MDA. As per the study by Yoo et al., the anterior cortical line of the tibia can differ from the MA of tibia by as high as $6.2^\circ$ (mean 3.2, standard deviation 1.3).[9]

Furthermore, it was noted that, for a given PTS, the error between the MA and the anterior cortical line is increased when the MDA increases and vice versa. Therefore, higher MDA makes it susceptible to increase the difference between the anatomical axis obtained from an extramedullary jig (aligned on the diaphysis and the anterior cortical line) and the MA: The greater the MDA, the greater the difference between the diaphyseal axis and the MA in the sagittal plane.[10]

Thus, the extramedullary jig, which is kept parallel to the anterior cortical line, will not compensate for any change in the MDA and hence will lead to a different tibial cut depending on the MDA. The surgeon, who bases himself on the diaphyseal axis, will overestimating the real tibial slope in tibias with a great MDA. This could even lead surgeons to invert the tibial slope in tibias with low native PTS.

Kansara et al. did a clinical study on 61 patients undergoing TKA. The tibial cutting guides accurately achieved the intended posterior slope, but increasing posterior slope from $0^\circ$ to $5^\circ$ did not result in a significant increase in the range of movement or Hospital for Special Surgery functional score. In addition, in some cases, attempting a $0^\circ$ slope gave rise to a negative slope, which was not seen with a $5^\circ$ intended slope.

Thus, MDA holds potential for a new value to be taken into consideration while planning for sagittal anatomy in TKA.

This study does have limitations. The sample was collected from the patients planned for TKA. Hence, the results of PTS does not apply to the general population. The sample size was small. MRI was not employed in this study, but in an MRI study done by Hashemi et al., the mean tibial slope of the lateral plateau was found to be higher than medial. For simplification, the two plateaus were assumed to be equal. The lateral radiographs do not take into account the slope contributed by the Menisci which will require an MRI. Single observer calculated the angles by manual technique using lateral radiographs and goniometer. Computer-assisted (navigation-assisted TKR) TKR was not available in the institution where the study was conducted. The functional correlation of MDA on knee arthroplasty could not be correlated as very many other variables were not taken into account due to the limited scope of this study.

Studies have shown that the most accurate method to measure the PTS is CT scan.[12,14] Besides, medial tibial slope and lateral tibial slope vary in a single patient.[7,12,13] However, Chiu et al. found a good agreement between the PTS measured on radiographs and the actual tibial slope measured on the cadaveric tibia.[7] Other anatomical aspects of the knee such as the coronal plane alignment of tibia and its variations with the age, sex, and the onset of osteoarthritis, the mediolateral and anteroposterior dimensions of the tibia, and the correlation between these variables were not considered.

**CONCLUSION**

In the past few decades, the life expectancy of human beings has increased dramatically. This has caused more population opting for elective total knee replacement to reduce their knee joint-related morbidities.

In this study, we found that females undergoing total knee replacement have nearly the same slope as males. Furthermore, age had no significant correlation with variation in PTS of the patients.

The study highlights the ethnic differences in the PTS. It was noted that the pre-operative PTS in patients undergoing TKA in central India is around $13.4^\circ$, which is in accordance with various studies which suggest that PTS in patients of oriental population with osteoarthritic knees is higher than the Caucasian population.

A significant correlation between the pre-operative PTS and the MDA was observed in this study. As PTS and MDA vary in the same direction, there is a substantial risk of error when cutting the tibia based on an extramedullary jig. This error with respect to desired $0^\circ$–$7^\circ$ of post-operative slope in every patient gets substantial in patients with a higher MDA (Group B in our study).

Although surgeons are able to achieve the desired PTS at the higher extreme of the range of $0^\circ$–$7^\circ$, patients with MDA above $19^\circ$ tend to have post-operative PTS significantly higher than the desired values making them vulnerable to complications. In a patient with a MDA of $<19^\circ$, planned PTS $<3^\circ$ should be avoided as it risks giving a negative tibial slope or an anterior tibial slope, which is associated with an adverse biomechanics. Moreover, cases with MDA of more than $19^\circ$ a planned PTS of more than
5° should be avoided. We think a PTS of 3-5° should be safe in all cases.

Thus, MDA should be considered during the planning of a total knee replacement. Necessary modifications (such as pre-operative templating, intraoperative jig angle setting, and using intramedullary jigs) should be done in the current protocols to achieve desired PTS in patients having higher MDA.

This information is important during pre-operative planning for TKA. There seems a need for more research on Indian population to develop better implant and techniques for total knee replacement in the Indian subcontinent.

SUMMARY

Average PTS in Indian patients with osteoarthritic knees is found to be higher than the Caucasian population. The MA in the arthritis patients is shifted further posteriorly as shown by increased PTS in arthritic patients. Of various methods to calculate PTS, lateral radiographs are most commonly used. Post-operative PTS after TKA has been implicated to affect the incidence of complications such as aseptic loosening, knee joint subluxation, tibial lesions, and coronal plane joint instability. Most surgeons in North India desire post-operative PTS within the range of 0–7°.

In this study, data of 30 knees undergoing total knee arthroplasty in the Department of Orthopedics and Traumatology, Index hospital, Indore, India were analyzed. Pre-operative (pre-operative PTS), MDA, and post-operative PTS (post-operative PTS) were recorded. Data were analyzed using Pearson correlation coefficient. Based on MDA, knees were divided into two groups (A-MDA ≤19° and B-MDA >19°). Characteristics of these groups were compared with Unpaired t-tests.

The mean pre-operative PTS was 13.40° with a standard deviation of 3.67°. This was more than the range of 5°–10° found in western populations. The mean MDA was 20.13° with a standard deviation of 3.19°. The mean post-operative PTS was 9.6° with a standard deviation of 3.79°.

There is a strong correlation between pre-operative PTS and MDA with Pearson coefficient of 0.736. Furthermore, the pre-operative PTS as well as post-operative PTS in the group A (MDA ≤19°) was significantly less group B (MDA >19°).

The knees with higher MDA tend to have higher pre-operative PTS and vice versa. Although surgeons are able to achieve the desired PTS at the higher extreme of the range of 0–7°, patients with MDA above 19° tend to have post-operative PTS significantly higher than the desired values making them vulnerable to complications. Hence, necessary modifications (such as pre-operative templating, intraoperative extramedullary jig angle setting, and using intramedullary jigs) should be done in the current protocols to achieve desired PTS in patients having higher MDA.

REFERENCES


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A Hospital Based Clinical Study on Patients with Colorectal Carcinoma Stage I

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Abstract

Background: Colorectal carcinoma is a common surgical condition in India. The prognosis is good in Stage I but depends on the lymphovascular involvement which represents an important prognostic factor. Lymphovascular invasion is used as a criterion in assessing the aggressiveness of the carcinoma.

Aim of the Study: The aim of the study was to study, identify high-risk factors in recurrences of Stage I colorectal carcinoma patients, using lymphovascular invasion as a working tool.

Materials and Methods: A retrospective study on 43 patients undergoing curative surgery for colorectal carcinoma Stage I between 2008 and 2016 in a tertiary teaching hospital. The number of years with disease-free status is taken as an endpoint cure. Clinical and pathological factors which included lymphatic invasions were used to assess and analyze (univariate analyzes) the disease-free survival (DFS) period.

Observations and Results: A total of 43 patients with Stage I colorectal carcinoma out of 138 patients (31.15%) with different stages of colorectal carcinoma were studied. Patients aged between 45 and 74 years were included with a mean age of 56.25 ± 3.60. Males were 32 and females were 11. The mean age in the females was 60.80 ± 2.70 and in males the mean age was 58.35 ± 2.40. The male to female ratio was 2.90:1. The univariate analysis showed that lymphovascular invasion was the only independent factor statistically significant and affecting the 5 years DFS. All the other factors such as age, gender, carcinoembryonic antigen values, lymph node involvement, tumor depth, and tumor location were not significant as the P value was above 0.05.

Conclusions: In the present study, only the lymphovascular invasion was identified as an independent factor which was statistically significant in determining the 5 years DFS in patients with colorectal carcinoma Stage I undergoing curative resection. All the other factors were insignificant. The probable cause for the recurrence and metastases may be due to an undetected or undetectable local or systemic residual of the tumor at operation.

Key words: Carcinoma, Chemotherapy, Colorectal, Lymphatic invasion, Recurrence, Stage I

INTRODUCTION

Colorectal carcinoma is one of the most common malignant tumors all over the world.[1,2] Presence or absences of lymph nodes, as well as their degree of invasion, vascular invasion and depth of primary tumor, are useful in determining the chemotherapy and further surveillance of patients.[3,4] Not only the presence but also the 12 nodes or more must be examined to adequately assess the degree of lymph node metastasis.[5,6] Their number available to be examined depends on the extent of resection, recovery from the specimen, and counts of slides, and can, therefore, vary widely among patients, hospitals, and countries.[7,8] Surgery is the mainstay of treatment in majority of the colorectal carcinoma Stage I patients. Whether Adjuvant chemotherapy is used or not in the patients with colorectal carcinoma Stage I varies from country to country. Lymphovascular invasion is usually used in assessing the aggressive nature of colorectal cancer.[9,10] 10% of the colorectal carcinoma patients develop recurrence and metastases in spite of excellent prognosis quoted in the literature.[11] For follow-up such high-risk tumor recurrence patients should be identified.[12]
The present study was conducted to find the correlation between lymphatic invasion and lymph node metastasis and incidence of recurrence.

**Aim of the Study**
The aim of the study was to study identify high-risk Stage I colorectal carcinoma patients using lymphovascular invasion as a working tool.

**Period of Study**
This study period was from August 2008 to 2016 (9 years).

**Institute of Study**
General Hospital attached to Kannur Medical College, Anjarakandy, Kannur, Kerala.

**MATERIALS AND METHODS**
A total of 43 patients diagnosed with colorectal carcinoma Stage I and underwent surgery at General Hospital attached to Kannur Medical College, Anjarakandy, a tertiary teaching hospital were included in this retrospective study. Institutional Ethical committee clearance was obtained for the study. All the data were retrieved from the medical records section of the hospital.

**Inclusion Criteria**
1. Patients with the diagnosis of colorectal carcinoma Stage I were only included.
2. Patients of all age groups were included.

**Exclusion Criteria**
1. Patients with colorectal carcinoma other than Stage I were excluded.
2. Patients with metastases were excluded.
3. Patients who have received chemotherapy were excluded.

All the case sheets were looked for detail history and complaints with which the patients presented. Patients with bone pain had been investigated further with estimation of carcinoembryonic antigen (CEA). Such patients were subjected to whole body scan to rule out bone metastases. Clinical signs recorded in the cases sheets were site of the lesion, size, gross appearance, and staging. On histopathology of the biopsy specimen, the cell differentiation was noted. The surgical treatment adopted was noted; type of operation, lymph node involvement, complications, recurrence, and follow-up conditions. Staging of the disease was done by determining tumor-node-metastasis (TNM) classification system of the American Joint Committee on Cancer. All the patients were flowed up for 5 years at 3 monthly intervals for initial 2 years and later on yearly for 3 years. During follow-up X-ray chest, abdominal ultrasound and/or computed tomography (CT) scan abdomen were undertaken. Every 6 months or 1-year colonoscopy was performed up to 3 years. In patients with increased levels of CEA were performed unscheduled CT, a whole-body bone scan, or PET scan was performed. National Comprehensive Cancer Network clinical practice guidelines in oncology were used to identify the risk factors in the study.[13] They included emergency surgery, lymphovascular involvement, poorly differentiated histology, lymph nodes harvested <12 in number, and high CEA levels. All the data were analyzed using standard statistical methods.

**OBSERVATIONS AND RESULTS**
In the present study, 43 patients with Stage I colorectal carcinoma were selected out of a total 138 patients with different stages of colorectal carcinoma. Stage I patients accounted for 31.15% of the total 138 patients. The age group involved was between 45 and 74 years with a mean age of 56.25 ± 3.60. There were 34 (74.41%) male patients and 11 (25.59%) female patients. The mean age in the females was 60.80 ± 2.70 and in males the mean age was 58.35 ± 2.40. The male to female ratio was 2.90:1 [Table 1].

Histopathology studies showed adenocarcinoma in 39 patients (67.44%), mucinous adenocarcinoma in 10 (23.26%), malignant lymphoma in 3 (6.97%), and neuroendocrine in 1 (2.32%) [Table 2].

Involvement of colon was observed in 22 (51.16%) patients and rectum in 21 (48.83%) patients. T1 was found in 20 (46.51%) patients and T2 in 23 (53.48%) patients. The serum CEA levels were more than 5 ng/mL was observed in 34/43 (79.06%) patients and <5 ng/mL in 9 (20.93%) patients. All the patients underwent curative surgical resection of the tumor and lymph node dissection with a mean of 13.54 ± 0.45 nodes removed in the study. Lymph node involvement was identified in 21 patients (48.83%). Lymphovascular invasion was found in 7 (16.27%) patients and not found in 36 (83.72%) patients. In 19 (44.18%) patients below 12 lymph nodes were harvested and in 24 (55.81%) patients more than 12 lymph nodes were harvested. The mean lymph node collection per specimen resected was 13.54 ± 0.45 [Table 3]. Follow-up of patients

**Table 1: The age and gender incidence (n=43)**

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Male (%)</th>
<th>Female (%)</th>
<th>Total percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>45–55-10</td>
<td>8 (18.60)</td>
<td>2 (4.65)</td>
<td>23.25</td>
</tr>
<tr>
<td>55–65-15</td>
<td>11 (25.58)</td>
<td>4 (9.30)</td>
<td>34.88</td>
</tr>
<tr>
<td>65–75-18</td>
<td>13 (30.23)</td>
<td>5 (11.62)</td>
<td>42.86</td>
</tr>
</tbody>
</table>

Kumar: Clinical Study on Colorectal Carcinoma Stage-I
for 5 years were done for 5 years and among 43, 12 patients developed recurrence (27.90%). The 5-year survival rate was observed in 31 patients (72.09%). Out of 12 patients that developed recurrence 5 had liver metastasis, 4 patients had lung metastasis, and 3 patients’ peritoneal metastases. The univariate analysis of the data collected showed that lymphovascular invasion was the only independent factor that was statistically significant and affecting the 5-year disease-free survival (DFS). All the other factors such as age, gender, CEA values, lymph node involvement, tumor depth, and tumor location were not significant as the P value was above 0.05 [Table 3].

**DISCUSSION**

Compared to the Western world, the incidence rates of colorectal cancer are low in India. It varies for colon cancer from 0.7 to 3.7/100,000 among men and 0.4 to 3/100,000 among women, and for rectal cancer from 1.6 to 5.5/100,000 among men and 0 to 2.8/100,000 among women.[14] The annual incidence of colorectal carcinoma in India is about 4/100,000 while the developed Asian countries such as Japan, Korea, and Singapore who have adopted a Western lifestyle, have an incidence of about 40/100,000.[15] The annual incidence of colorectal cancer in Kerala state is about 5.5/100,000 because the Kerala population eats more meat than the rest of the Indian population.[15] In a hospital based study by Cherian et al.,[14] among 98 patients with colorectal carcinoma, adenocarcinomas constituted 98%, and other tumors were two cases of lymphoma, one neuroendocrine carcinoma, and one sarcoma. The demographic details of the remaining 94 patients showed 79% were above the age of 50. The male:female ratio was about 2:1. The Christians were 40%, the Hindus 39%, and the Muslims 21%, more or less similar to the religious divisions in this region. Of the 98 cases, 75% were in the left colon or rectum, and 25% were in the right colon or transverse colon. 62 cases, 84% had a pathological staging of T3 or above, and 16% had a pathological staging of less than T3 according to the TNM classification. Lymph node metastases were diagnosed in 34 of 62 cases, and the average lymph node collection per specimen was 15. In this study, 43 patients with Stage I colorectal carcinoma were selected out of 138 colorectal carcinoma patients. The age group involved was between 45 and 74 years with a mean age of 56.25 ± 3.60. There were 32 (74.41%) male patients and 11 (25.58%) female patients. The mean age in the females was 60.80 ± 2.70 and in males the mean age was 58.35 ± 2.40. The male to female ratio was 2.90:1. Lymph node involvement was identified in 21 patients (48.83%). The average lymph node collection per specimen resected was 14. The serum CEA levels were more than 5 ng/mL was observed in 34/43 (79.06%) patients. Patients with Stage I CRC have an excellent prognosis after oncologic resection, with reported 5-year survival rates of about 90%.[9,17] In this study, the 5-year DFS of Stage I CRC patients was 72.09% which was compatible with the results of previous studies.[9,11,17] The univariate analysis of the data collected showed that lymphovascular invasion was the only independent factor that was statistically significant and affecting the 5-year DFS. All the other factors such as age, gender, CEA values, lymph node involvement, tumor depth, and tumor location were not significant as the P value was above 0.05 [Table 3].

**CONCLUSIONS**

In this study, only the lymphovascular invasion was identified as an independent factor which was statistically significant in determining the 5-year DFS in patients with colorectal carcinoma Stage I undergoing curative resection. All the other factors were insignificant. The probable cause for the recurrence and metastases may be due to an undetected or undetectable local or systemic residual of the tumor at operation.

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**Table 2: The type of histopathology (n=43)**

<table>
<thead>
<tr>
<th>Histopathology report</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenocarcinoma</td>
<td>29 (67.44)</td>
</tr>
<tr>
<td>Mucinous adenocarcinoma</td>
<td>10 (23.25)</td>
</tr>
<tr>
<td>Malignant lymphoma</td>
<td>3 (06.97)</td>
</tr>
<tr>
<td>Neuroendocrine</td>
<td>1 (02.32)</td>
</tr>
</tbody>
</table>

**Table 3: Univariate analysis for 5 years DFS, (n=31)**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Number</th>
<th>5 years survival rate - %</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;60</td>
<td>13/18</td>
<td>72.22</td>
<td>0.476</td>
</tr>
<tr>
<td>&gt;60</td>
<td>18/25</td>
<td>72.00</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24/32</td>
<td>75.00</td>
<td>0.476</td>
</tr>
<tr>
<td>Female</td>
<td>07/11</td>
<td>63.63</td>
<td></td>
</tr>
<tr>
<td>Tumor location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colon</td>
<td>16/22</td>
<td>72.72</td>
<td>0.082</td>
</tr>
<tr>
<td>Rectal</td>
<td>15/21</td>
<td>71.42</td>
<td></td>
</tr>
<tr>
<td>Tumor depth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>16/20</td>
<td>80.00</td>
<td>0.075</td>
</tr>
<tr>
<td>T2</td>
<td>15/23</td>
<td>65.21</td>
<td></td>
</tr>
<tr>
<td>Pre-operative CEA levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 ng/mL</td>
<td>09/09</td>
<td>100.00</td>
<td>0.324</td>
</tr>
<tr>
<td>&gt;5 ng/mL</td>
<td>22/24</td>
<td>91.66</td>
<td></td>
</tr>
<tr>
<td>Lymphovascular invasion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>02/07</td>
<td>28.57</td>
<td>0.016</td>
</tr>
<tr>
<td>No</td>
<td>29/36</td>
<td>80.55</td>
<td></td>
</tr>
<tr>
<td>Lymph nodes harvested</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;12</td>
<td>14/19</td>
<td>73.68</td>
<td>0.547</td>
</tr>
<tr>
<td>&gt;12</td>
<td>17/24</td>
<td>70.83</td>
<td></td>
</tr>
</tbody>
</table>

DFS: Disease-free survival, CEA: Carcinoembryonic antigen
REFERENCES


Early Post-operative Wound Infection in Patients Undergoing Orthopaedic Surgery with Implant

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Abstract

Introduction: Surgical site infections (SSIs) are important complications of orthopaedic procedures involving prosthetic implants.

Purpose: The aim of this study was to find out the different type of microorganisms causing early post-operative infection in case of implant surgery along with their antimicrobial susceptibility pattern.

Material and Methods: The study was conducted in Medical College, Kolkata, for a period of 1 year (February 2014–January 2015). Cases were selected in the Department of Orthopaedics, who had undergone surgery with an implant for close fracture and developed early post-operative wound infection (POWI). The wound was examined on day 3, day 7, and day 14 at discharge and subsequent follow-up visits. The criteria for the diagnosis of POWI were those used by the National Research Council of USA. Wound swabs were taken from the patient who presented with early post-operative SSI and was sent to the Department of Microbiology for isolation, identification, and antimicrobial susceptibility of the causative microorganisms.

Results: A total number of 80 patients were included in this study during the period of 1 year. Most cases presented within 8–21 days postoperatively. The most common organism isolated from early infection in the post-operative surgical site was Staphylococcus aureus 39% followed by Klebsiella spp. 17% and Pseudomonas spp. 15%. All S. aureus were sensitive to linezolid, vancomycin, and all Klebsiella spp. were sensitive to imipenem and polymyxin B.

Conclusion: Judicial use antibiotic in POWI is required only after proper culture and sensitivity report to prevent the emergence of more resistant strains of pathogens.

Key words: Implant surgery, Methicillin-resistant Staphylococcus aureus, Post-operative, Resistance, Wound infection

INTRODUCTION

In orthopaedics, surgical site infection (SSI) after implant surgery is a disaster both for the patient and surgeon. This leads to increased antibiotic use, prolonged hospital stay, repeated debridement, prolonged rehabilitation, and morbidity and mortality.[1] SSIs are important complications of orthopaedic procedures that involve prosthetic implants.

The number of elderly and trauma patients requiring joint replacement or internal fixation devices is steadily increasing. Open reduction and internal fixation (ORIF) of fractures with implants and prosthesis have become the predominant modality of treatment of fractures in most trauma centers. This is not only because of the better understanding of the biomechanics of implantable materials but also more importantly because of the better functional outcome in these patients.[2] Incidentally, this is associated with post-operative wound infection (POWI) reported to be in the range of 0.8–13% for both deep and superficial infections with increasing morbidity and cost. This category of patients is particularly vulnerable because ORIF interferes with the blood supply to the bones and implants are foreign bodies, which provide surfaces for bacterial adherence.[3] Despite considerable progress in prevention and treatment of implant-associated infection,
the absolute number of patients with such infections is rising due to the lifelong risk for bacterial seeding on the implant. The SSI prolongs hospital stay on average for 2 weeks, doubles re-hospitalization rates, and costs can increase by over 300%. In addition, patients may have physical limitations and significant reduction in the quality of life. The pathogenesis of infection in fracture fixation devices is related to microorganisms, which grow in biofilm, and therefore its eradication is difficult.

In prosthetic joint infections, early infection is defined as manifestation of infection at the implant site during the first 3 months after surgery. Delayed infection is defined as the manifestation of infection 3–24 months after surgery. Late infection is defined as the manifestation of infection more than 2 years after surgery.

This aim of this study was to find out the different type of microorganisms causing early (<3 month) post-operative infection in case of implant surgery along with their antimicrobial susceptibility pattern.

**MATERIAL AND METHODS**

After obtaining Ethical Clearance from the Institute and informed consent from the patients, this study was conducted in Medical College and Hospital, Kolkata, for a period of 1 year (February 2014–January 2015). Cases were selected by consecutive sampling among the patients, who were admitted or came for follow-up in the Department of Orthopaedics, who had undergone surgery with an implant for closed fracture and disease and developed early POWI. This included all those patients who had a history of closed fracture and were treated with open/closed reduction with the orthopaedic implant in situ or disease of bone/ligaments injury in which orthopaedic implant was used during operation. Arthroscopic surgery patients were also included in which implant had been used. Patients having an open fracture, POWI, soft tissue surgery, diabetes, or any other immunocompromised state and whose infection occurred after 3 months were excluded from the study.

The wound was examined on day 3, day 7, and day 14 at discharge and subsequent follow-up visits at the outpatient clinic or whenever patients complained of fever or burning sensation at operated site. The criteria for the diagnosis of POWI were those used by the National Research Council of USA who defined POWI as “the presence of pus in a wound which has either discharged spontaneously or has to be released by the removal of sutures or re-opening the incision.”

Wound swab was taken from the patient who presented with early post-operative SSI and was sent to the Department of Microbiology, Medical College, Kolkata, for further processing. After performing a direct microscopy of the Gram-stained smear, the pus was inoculated on blood agar, MacConkey agar and thioglycollate broth. Isolation, identification of the microorganisms and their antimicrobial susceptibility was done using standard techniques.

**RESULTS**

A total number of 80 patients were included in this study during the period of 1 year (from February 2014 to January 2015) having early POWI. There were 45 (56.25%) male and 35 (43.75%) female patients.

Most patients in 6th, 5th, 4th, and 3rd decades had SSI [Figure 1].

In most cases, 27 (33.75%) surgery was done in 3rd week following injury followed by 2nd week seen in 18 (22.5%), then 8 (10%) each in 1st week, 4th week and after 6th week and 4 (5%) during 5th and 6th week following injury. Seven cases were associated with either disease or deformity so time interval could not be determined in those cases.

Maximum infections were detected, and wound swabs were sent for culture in 2nd week after surgery followed by 3rd week as shown in Table 1. Only 10% (8 cases) had infections beyond 8 weeks [Table 1].

The different implants and prosthesis that were used in the different surgery were plates with screws in 37 (46%), nails in 15 (19%), screw and wires in 15 (19%), and DHS/DCS in 7 (9%) cases. Infection in case of the hip prosthesis was seen in 6 (8%) which included four cases of hemiarthroplasty and two cases of total hip arthroplasty. Among the included cases, infection in femoral implants was most common in 19 (24%) cases. It also included intertrochanteric, sub-trochanteric and all extra-articular fractures of the femur. Humerus was second most common

**Figure 1: The age distribution of the patients**
site seen in 13 (16%) cases. Tibia and radius/ulna were the third most common site, each 11 (14%) of cases. All intra-articular operation including knee, hip, ankle, elbow, shoulder comprised 26 (32.5%) cases with knee involved in 7, hip, ankle, and elbow involved in 6 each, and shoulder in one patient.

The most common organism isolated from early infection in the post-operative surgical site was *Staphylococcus aureus* 32 (39%) followed by *Klebsiella* spp. 14 (17%), *Pseudomonas* spp. 12 (15%), *Escherichia coli* 4 (5%), 3 *Proteus* spp., 2 each of *Acinetobacter* spp., *Enterococcus* spp., coagulase-negative Staphylococcus, and 1 *Citrobacter* spp. In two specimen isolated organism was of mixed type (one it was *S. aureus* and *Proteus mirabilis* and in other it was *Pseudomonas* with Klebsiella). Significant portion (n = 10) of cultures had no growth.

Among the 32 isolates of *S. aureus*, all (100%) were sensitive to linezolid vancomycin followed by high susceptibility to clindamycin (81.2%), gentamicin (81.2%), amikacin (65.6%), doxycycline (65.6%), and amoxicillin/clavulanate (62.5%) [Table 2]. 24 (75%) of the isolates were methicillin-resistant *S. aureus* (MRSA). A total of 22 Enterobacteriaceae were isolated comprising 14 *Klebsiella* spp., 4 *E. coli*, 3 *Proteus* spp., and 1 *Citrobacter* spp. The isolates were 100% sensitive to imipenem followed by meropenem (86.4%). They were also sensitive (68.2%) to amikacin, gentamicin, and piperacillin/tazobactam. Sensitivity to piperacillin alone was 27.3% only, but its combination with tazobactam was 68.2%. Sensitivity to ciprofloxacin and levofloxacin was 63.6% [Table 2]. *Pseudomonas* species were most susceptible to piperacillin/tazobactam, imipenem, meropenem, tobramycin, polymyxin B, and levofloxacin [Table 2].

Other organisms isolated were two isolates each of coagulase-negative *Staphylococcus*, *Enterococcus* spp., and *Acinetobacter* spp. Coagulase-negative *Staphylococcus* species were probably from skin contamination during collection of samples. Isolated *Enterococcus* species were sensitive to ampicillin, amoxicillin, linezolid, vancomycin, doxycycline, and ticarcillin. Isolated *Acinetobacter* species were sensitive to imipenem, meropenem, ciprofloxacin, levofloxacin, and piperacillin/tazobactam.

### DISCUSSION

Orthopaedic implants have revolutionized the treatment of bone fractures and non-infectious joint arthritis. Today, the risk for orthopaedic device–related infection (ODRI) is <1–2%. However, the absolute number of patients with infection continuously increases as the number of patients requiring such implants grow. Treatment of ODRIs most frequently includes long-term antimicrobial treatment and removal of the implant. With recent advances in infection prevention measures including pre-operative antimicrobial prophylaxis, improved sterilization techniques and aseptic measures, routine post-operative antibiotic prophylaxis, and even greater reduction in infection rate have resulted. Nevertheless, infection at the operative site may lead to a potentially devastating, even fatal, outcome.[6] Implant-related infection is an unresolved problem. Infections occur even after the orthopaedists perform thoroughly clean procedures and patients are carefully managed before and after surgery.[7] While colonization necessarily precedes infection, the presence of bacteria by itself does not constitute infection. This has been emphasized by the findings of a study on hardware removal in which 50% of cultures were positive in patients with no signs or symptoms of infection.[7]

In this study, positive culture was seen in majority of the cases (89%), which is similar to the finding of 89% by Zimmerli et al.[8] but more than that of Gomez et al. who reported positive cultures in 60%.[9] The causative organisms in the early post-operative implant infections were found to be *S. aureus* (39%), *Klebsiella* spp. (17%), and *Pseudomonas* spp. (15%). These findings are similar to that of an extensive study by Arciola et al. who reported Staphylococci as the most prevalent organism.[8] In another study in India by Agrawal et al. it was found that the most common infecting organism was *E. coli* (34.4%) followed by *Pseudomonas* spp. and then *S. aureus*. This is in contrast to our study wherein we found more *S. aureus* than *E. coli* and *Pseudomonas* spp. However, their study was regarding all sorts of orthopedic infections including bedsores, osteomyelitis, and open fractures.

All the *S. aureus* isolates were sensitive to linezolid and vancomycin though these are kept as reserve drugs and should be used as last resort for fear of the emergence of resistant organisms. The results of our study are contradictory to the results of Thool et al.[10] wherein they had found that 12 out of 51 isolated *Staphylococcus* species were resistant to linezolid with resistance increasing in recent years. A potential cause of such resistance is the overuse of linezolid on patients with Staphylococcus pneumoniae infection during hospital stay. While colonization necessarily precedes infection, the presence of bacteria by itself does not constitute infection. This has been emphasized by the findings of a study on hardware removal in which 50% of cultures were positive in patients with no signs or symptoms of infection.[7]

**Table 1: The time interval after surgery with the number of cases detected**

<table>
<thead>
<tr>
<th>Time interval</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–7 days</td>
<td>2</td>
</tr>
<tr>
<td>8–15 days</td>
<td>26</td>
</tr>
<tr>
<td>16–21 days</td>
<td>20</td>
</tr>
<tr>
<td>22–28 days</td>
<td>8</td>
</tr>
<tr>
<td>29–35 days</td>
<td>2</td>
</tr>
<tr>
<td>36–42 days</td>
<td>5</td>
</tr>
<tr>
<td>43–49 days</td>
<td>5</td>
</tr>
<tr>
<td>50–56 days</td>
<td>4</td>
</tr>
<tr>
<td>&gt;56 days</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>80 cases</td>
</tr>
</tbody>
</table>
were resistant to linezolid. The increasing prevalence of MRSA infections represent a significant health-care burden. Vancomycin and linezolid exhibit potent clinical and microbiological activity in MRSA infections. In this study, there is a prevalence of 75% MRSA among the Staphylococcus aureus isolates.

*Klebsiella* spp. was the second most common (17%) microorganism isolated from the infected surgical site. Overall isolated Enterobacteriaceae were 22, comprising *Klebsiella* spp. 14, *E. coli* 4, *Proteus* spp. 3, and *Citrobacter* spp. 1. They were 100% sensitive to imipenem followed by meropenem (86.4%). However, meropenem and imipenem should not be used initially to prevent the emergence of resistance. Hence, piperacillin-tazobactam + amikacin/gentamicin or ciprofloxacin + amikacin/ gentamicin are used in case of post-operative infection with Enterobacteriaceae family.

With the great increase in the level of orthopaedic surgery and with the evolution of techniques such as arthroscopy, recent advances in spine surgery and evolution of the modern arthroplasty the risk of infection is a great threat. It is always better to prevent the development of frank infection with prompt drugs and know the microbial profile of the infections in that area so that measures can be taken to prevent them. We all know that implant infections and osteomyelitis might just be the most difficult morbidities to treat. Osteomyelitis may even lead to amputation.

In general, in any orthopaedic case, a pair of antibiotics covering both the Gram-negative and Gram-positive infections should be employed. Whenever there is suspicion of an anaerobic infection, another antibiotic for anaerobes should be added. However, injudicious use of antibiotics may lead to antibiotic resistance and decreased patient immune response. Prompt use of the most sensitive antibiotics as early as possible as empirical therapy, to which most of the common infecting bacteria would succumb will help us in preventing frank life and limb-threatening infections.

Antibiotic treatment alone is quite often inadequate to treat prosthesis-related infections, especially when it comes to biofilm infections. In most cases, a combination of antibiotic therapy with surgical interventions, which can be divided into debridement with retention of the prostheses and staged exchange of the prostheses, is required.

In our center, antibiotics to prevent infections in the post-operative period are given, and the chances of developing an infection after giving these empirical antibiotics are still present. Despite these, if infection develops postoperatively then before switching over to another antibiotic, wound culture must be done, and further antibiotics should be

---

**Table 2: The susceptibility of organisms isolated**

<table>
<thead>
<tr>
<th>Antimicrobial agent</th>
<th><em>Staphylococcus aureus</em> (n=32 (%))</th>
<th><em>Klebsiella</em> sp (n=14)</th>
<th>Other Enterobacteriaceae (n=8)*</th>
<th><em>Pseudomonas</em> spp. (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>1 (3.1)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>NA</td>
<td>1 (12.5)</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>2 (14.3)</td>
<td>4 (50)</td>
<td>1 (8.3)</td>
<td></td>
</tr>
<tr>
<td>Ticarcillin</td>
<td>NA</td>
<td>NA</td>
<td>6 (50)</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin/clavulanic acid</td>
<td>3 (21.4)</td>
<td>2 (25)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
<td>7 (57.1)</td>
<td>10 (83.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>8 (25)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Cefoperazone</td>
<td>NA</td>
<td>3 (37.5)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>NA</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>NA</td>
<td>4 (50)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Cefepine</td>
<td>6 (42.8)</td>
<td>5 (62.5)</td>
<td>3 (25)</td>
<td></td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>NA</td>
<td>NA</td>
<td>2 (16.7)</td>
<td></td>
</tr>
<tr>
<td>Imipenem</td>
<td>NA</td>
<td>8 (100)</td>
<td>10 (83.3)</td>
<td></td>
</tr>
<tr>
<td>Meropenem</td>
<td>11 (78.6)</td>
<td>8 (100)</td>
<td>11 (91.7)</td>
<td></td>
</tr>
<tr>
<td>Amikacin</td>
<td>7 (50)</td>
<td>8 (100)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Gentamicin</td>
<td>7 (50)</td>
<td>8 (100)</td>
<td>3 (25)</td>
<td></td>
</tr>
<tr>
<td>Tobramycin</td>
<td>NA</td>
<td>NA</td>
<td>11 (91.7)</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>8 (57.1)</td>
<td>6 (75)</td>
<td>9 (75)</td>
<td></td>
</tr>
<tr>
<td>Levofloxacin</td>
<td>8 (57.1)</td>
<td>6 (75)</td>
<td>11 (91.7)</td>
<td></td>
</tr>
<tr>
<td>Doxycycline</td>
<td>1 (7.1)</td>
<td>3 (37.5)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Polymyxin B</td>
<td>NA</td>
<td>14 (100)</td>
<td>12 (100)</td>
<td></td>
</tr>
<tr>
<td>Trimethoprim/Sulfamethoxazole</td>
<td>9 (28.1)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Clindamycin</td>
<td>26 (81.2)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Erythromycin</td>
<td>11 (34.4)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Linezolid</td>
<td>32 (100)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>32 (100)</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

NA: Not applicable. *Other Enterobacteriaceae includes 4 E. coli, 3 Proteus spp., and 1 Citrobacter spp.
prescribed according to sensitivity reports keeping in mind reserve, and newer drugs should be the last resort.

With the overall drug sensitivity pattern, it is recommended that for empirical therapy we should start with a combination of amoxicillin/clavulanic acid or piperacillin + tazobactam along with gentamicin/amikacin as these drugs have been found to cover all bacteria including the Gram-positive Staphylococci or the Gram-negative Enterobacteriaceae or Pseudomonas spp. If resistance against these antibiotics is found then linezolid or vancomycin for Gram-positive Staphylococci, and meropenem/imipenem for resistant Enterobacteriaceae and Pseudomonas should be used.

CONCLUSION

For all orthopaedic surgical procedures with the implant, infection at the operative site has always been recognized as a potential complication. With recent advances in infection prevention measures including pre-operative antimicrobial prophylaxis, improved sterilization techniques and aseptic measures, routine post-operative antibiotic prophylaxis, even greater reduction of infection is possible. Nevertheless, infection at the operative site may lead to a potentially devastating, even fatal, outcome.

This study shows that S. aureus is the leading cause of early POWI in patients undergoing orthopaedic surgery with implant followed by Klebsiella spp. and Pseudomonas spp. as second and third most common pathogens, respectively. In case of S. aureus, the most sensitive antibiotics are linezolid and vancomycin and in Gram-negative bacteria, it is imipenem and polymyxin B, but these should not be used as initial drugs. It is worth mentioning here that, as we are entering into the post-antibiotics Era, it will be judicial to use antibiotics in POWI only after proper culture and sensitivity report to prevent the emergence of more and more resistant strains of pathogens.

REFERENCES


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Functional Outcome of Primary Cemented Hemiarthroplasty for Comminuted Unstable Pertrochanteric Femoral Fractures (AO/OTA Type 31 A2.3) in Elderly Osteoporotic Patients

S A Mustafa, Johney Juneja, Gurdeep Singh, Rishi Gupta

Department of Orthopedic, Index Medical College, Madhya Pradesh, India

Abstract

Introduction: Most intertrochanteric fractures occur in elderly people (above 65 years) with reported mortality rates ranging from 15% to 30%.[1] Problems with osteoporotic bone fractures are geometry (grossly comminuted), high instability, and difficult to treat. The primary treatment goal is stable fixation and immediate full-weight-bearing mobilization.[2] Intertrochanteric fractures occur in the transitional bone between the femoral neck and the femoral shaft.[3] Transitional bone is composed of cortical and trabecular bone. These bone types form the calcar femorale posteromedially, which provides the strength to distribute the stresses of weight bearing. Consequently, the stability of intertrochanteric fractures depends on the preservation of the posteromedial cortical buttress.[4] The physiological factors such as age, osteoporosis, medical diseases, and instability of fractures as components of these fractures are always overlooked.[5] Conservative treatment in such patients demands prolonged immobilization and lands up with complications of hypostatic pneumonia, pulmonary embolism, bed sores, senile psychosis, and finally, fatality.[6] These fractures should be classified as stable and unstable.[7] Various classifications for intertrochanteric fractures are mentioned in the literature, but none of them dictates the implant to be used in a specific fracture type. The most commonly used classification is the Jensen classification, which is a modification of the Evans classification, divides the fractures into stable and unstable, but it does not guide the surgeon to which implant to be used. Hence, we propose to divide the patients with intertrochanteric fractures into three groups as stated below and use the prosthesis accordingly.

INTRODUCTION

Most intertrochanteric fractures occur in elderly people (above 65 years) with reported mortality rates ranging from 15% to 30%.[1] Problems with osteoporotic bone fractures are geometry (grossly comminuted), high instability, and difficult to treat. The primary treatment goal is stable fixation and immediate full-weight-bearing mobilization.[2] Intertrochanteric fractures occur in the transitional bone between the femoral neck and the femoral shaft.[3] Transitional bone is composed of cortical and trabecular bone. These bone types form the calcar femorale posteromedially, which provides the strength to distribute the stresses of weight bearing. Consequently, the stability of intertrochanteric fractures depends on the preservation of the posteromedial cortical buttress.[4] The physiological factors such as age, osteoporosis, medical diseases, and instability of fractures as components of these fractures are always overlooked.[5] Conservative treatment in such patients demands prolonged immobilization and lands up with complications of hypostatic pneumonia, pulmonary embolism, bed sores, senile psychosis, and finally, fatality.[6] These fractures should be classified as stable and unstable.[7] Various classifications for intertrochanteric fractures are mentioned in the literature, but none of them dictates the implant to be used in a specific fracture type. The most commonly used classification is the Jensen classification, which is a modification of the Evans classification, divides the fractures into stable and unstable, but it does not guide the surgeon to which implant to be used. Hence, we propose to divide the patients with intertrochanteric fractures into three groups as stated below and use the prosthesis accordingly.
• Calcar and lesser trochanter intact, no communition bipolar prosthesis AMP type.
• Calcar is fractured or less-bipolar-Thompson’s type.
• Instability of posteromedial wall with lesser trochanter, calcar, and greater trochanter fractured-modular type of bipolar prosthesis with reconstruction of greater trochanter and calcar reconstruction.

In elderly osteoporotic patients, the metaphysis is broad with the thin cortex, and hence, for greater stability, prosthesis with broad metaphyseal end and long stem was used in all cases.

Furthermore, as mentioned earlier, integrity of the posteromedial buttress mainly decides the stability, and hence, we suggest the different methods of reconstructing greater trochanter, lesser trochanter, and calcar. Follow-up studies of internal fixation of such fractures with DHS show high percentage of failure like bending/break/cutout of implants. Studies comparing bipolar hemiarthroplasty versus internal fixation have also concluded that arthroplasty group had easier and faster rehabilitation. After implant failure, if revision osteosynthesis is planned, then it becomes technically extremely difficult and further immobilization adds up to the complications.

MATERIALS AND METHODS

The patients with proximal femoral fractures in elderly people with severe osteoporosis were admitted through OPD or casualty. They were screened clinically and radiologically preoperatively for knowing the anatomy of fracture and any associated disease such as hypertension, diabetes, and ischemic heart disease.

Inclusion Criteria
The following criteria were included in the study:
• Pre-injury status was ambulatory.
• Cooperative for physiotherapy.
• Severe osteoporosis.
• Elderly (age more than 65 years).

We included only the extracapsular fractures in the group of proximal femoral fractures.

Exclusion Criteria
The following criteria were excluded from the study:
• Pre-injury status non-ambulatory.
• Open fractures.
• Severely moribund patients.
• Uncontrolled diabetes mellitus.

We divided these fractures into three groups, and the type of prosthesis was used accordingly.
• Calcar and lesser trochanter intact, no communition bipolar prosthesis AMP type.
• Calcar is fractured or less-bipolar-Thompson’s type.
• Instability of posteromedial wall with lesser trochanter and calcar shattered-modular type of bipolar prosthesis with the reconstruction of greater trochanter and calcar reconstruction.

Operative Technique
With the patient in lateral position, incision was taken on the lateral aspect of hip, centered on proximal aspect of greater trochanter. Proximally, incision was curved posteriorly toward posterior–superior iliac spine. Tensor Fascia Lata was cut in the direction of skin incision. Proximally fibers of gluteus maximus were dissected along skin incision to expose fracture site. Now, we carefully dissected fracture site and retracted fracture fragments of greater trochanter so as to reach base of femur neck. We extracted femur head and the attached neck through this transstrochanteric window. After extraction of femoral neck and head, acetabulum was inspected and cleared of any of remaining bone pieces. Then, we started femoral canal preparation using reamer and serial broach’s. After preparing femoral canal, we drilled two holes on lateral aspect of proximal femur 5 cm below vastus ridge. Two holes were placed 2 cm away from each other. A stainless steel wire was passed from outside through one hole in the medullary canal and then taken out from another hole. Now, the two free ends of the wire are lying on the lateral aspect of the femur. The implant placement is now started with special emphasis on
1. Anteversion which is decided using long axis of the leg as guide.
2. Length of the implant to be inserted in the femur is decided by carefully judging soft tissue tension. Furthermore, tension is checked with help of shuck test showing <2–3 mm of displacement, no dislocation of the trial implant with 10° of extension, 50° of abduction, 40° of adduction external rotation of 30° and flexion 90–100°, and internal rotation of 40–50°. Furthermore, limb length was aimed to maintain almost the same as that of other limb and the amount of stem to be sunk in was carefully observed and marked both on trial and final implant before cementing, and then, cementing was done.
3. No excess cement should spread on fracture site as it interferes with the union of the fracture. We had reconstructed all the calcar with the help of cement. Once the final implant of adequate size is inserted, the hip is reduced. The fractured pieces of GT are now approximated to each other. A wire passer is passed above the tip of the trochanter deep inside the abductors. Previously, passed wire is now crossed over and passed through the wire passer, so as to complete figure of 8 which is now tightened. This achieves compression across the fracture site and restores the abductor mechanism of the hip. Closure is done in layers carefully over a negative suction drain.
Post-operative and Rehabilitation Protocol
All patients were kept under analgesic effect with the help of epidural catheter till 2 days post-operative. All the patients operated, except for those who had landed with few immediate complications, were started with physiotherapy. All patients were treated with quadriceps strengthening exercises immediately post-operative and full-weight-bearing walk next day with the help of walker for first 6 weeks post-operative. Thereafter, patients started full weight bearing with the support of a stick. Patients were instructed to use only Western Style commode for Toilet activity, strictly avoid Indian style commode, avoid activities involving squatting and cross-legged sitting for the rest of their life as a precautionary measure to avoid dislocation of the bipolar hemiarthroplasty. Patients were followed up regularly at 2 weeks, 4 weeks, 3 months post-operatively, and then yearly once.

Ethical Issue
Informed, valid, and willful consent was obtained from all patients before operation. The patients were treated with skeletal traction with Denham’s pin, while the patients were treated for associated problems, if any. All the patients were graded for osteoporosis according to Singh index. All were either grade 2 or grade 3. All the patients were given 4 injections decadurabolin fort nightly and calcium with Vitamin D3 once daily preoperatively and postoperatively. Pre-operative anesthetic evaluation for anesthetic finess was carried out. After fitness, patient was taken for surgery and cemented hemiarthroplasty was done using appropriate type of prosthesis modular, Thompson’s type or Austin Moore type [Figure 1] was used according to the fracture pattern as mentioned before. All prosthesis were specially designed with broad metaphyseal end and long stem.

We exposed the neck of femur through the fracture site by lateral approach [Figure 2] approximately 5 cm incision and removed only the head and the neck [Figure 3] leaving the greater trochanter intact with rotators. Reconstruction of greater trochanter was done with tension band technique/purse-string sutures with 5-0 Ethibond [Figures 4-6]. Lesser trochanter and calcar were reconstructed with encirclage/bone graft (fashioned from removed head and neck)/collar of cement at the site of calcar during insertion of prosthesis. [Figures 7a and b and 8-10]. Post-operatively, patient was treated with non-weight-bearing exercise of the hip and knee from day 1, bedside sitting and knee bending exercises from day 3, standing with support by the side of bed from day 5, and from day 7 onward patient was made to walk with walker. The sutures were removed on day 12, and the patient was discharged with advice to walk with walker, sit in chair, use western toilet, report to doctor in any suspicion of infection like UTI/URTI/local, not to squat or sit cross-legged, and to avoid uneven ground and busy roads. Subsequently, they
were followed up in OPD at monthly, 3 month, and 6 month and yearly intervals. After 3 months, walking with cane in opposite hand is advised till the end of 1 year.

**Observations**

From 23.03.07, we have done 50 cases of cemented hemiarthroplasty for proximal femoral fractures in elderly people with severe osteoporosis. Mean follow-up was of 29 months. Case - 1 [Figure 11a and b], Case - 2 [Figure 12a and b], and Case -3 [Figures 13-24].

**RESULTS**

This prospective study was done at the INDEX Medical College, Hospital and Research Centre, Indore, Madhya Pradesh.

From January 2016 to June 2017, 50 patients of intertrochanteric fracture femur were treated with cemented hemiarthroplasty. On the follow-up of 1 month
to 1 year, 2 patients died (due to co-morbid conditions) and 2 patients did not came for follow-up.

Detailed patient evaluation on the basis of history, clinical, and radiological examination was done, and data were collected accordingly. The post-operative evaluation was also done according to the above criteria. All patients were followed regularly.

Out of 50 cases, 50 patients were available for 1 month of follow-up, 48 patients were available for 6 months of follow-up, and 46 patients were available for the final follow-up at 1 year. The Harris hip scores were recorded at each follow-up.

Table 1 shows age distribution pattern of the patients. Average age - 79.5 years, youngest patient - 70 years, and oldest - 90 years [Figure 1].

Most of the patients were women [Table 2].
- 58% females (29/50)
- 42% males (21/50).

Right side affected in 56% of patients [Table 3].

66% of patients had unstable intertrochanteric fracture of Evans type 5, and AO type 31–A2.3. Rest 34% (17 patients) had Evans type 4, AO type 31–A2. 2 types of unstable intertrochanteric fracture are summarized in Table 4.

84% of patients had a trivial fall which resulted in unstable intertrochanteric fracture femur. Rest 8 patients had road traffic accidents [Table 5].

<table>
<thead>
<tr>
<th>Table 1: Age distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients age in years (range)</td>
</tr>
<tr>
<td>70–75</td>
</tr>
<tr>
<td>76–80</td>
</tr>
<tr>
<td>81–85</td>
</tr>
<tr>
<td>86–90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Sex distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (M/F)</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Side distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laterality (L/R)</td>
</tr>
<tr>
<td>Left</td>
</tr>
<tr>
<td>Right</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4: Classification of fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evans classification</td>
</tr>
<tr>
<td>Type 4</td>
</tr>
<tr>
<td>Type 5</td>
</tr>
</tbody>
</table>
Trivial fall included fall due to slip, fall on stairs, and fall while getting from bed.

Of 50 patients, 15 patients stayed for a week in the hospital [Table 6].

13 patients were admitted for maximum 10 days, and 1 patient stayed only 5 days in the hospital.

Most commonly used prosthesis was of size 45 mm, followed by 47 mm, 43 mm, 49 mm, and 41 mm [Table 7].

Maximum time taken for surgery - 100 min, least time - 70 min. 85 min was more often taken in the surgery, in 12 patients.

Average time taken in the surgery - 84.9 min [Table 8].

- Minimum blood loss in surgery - 150 ml [Table 9].
- Maximum blood loss - 500 ml
- Average blood loss - 204 ml.

Table 10 depicts hypotension occurred in two patients for which they were kept in medical I.C.U for observation. Superficial infection in the form of wound dehiscence was seen in three patients who were diabetic. They were managed by adequate control of diabetic status and use of appropriate parenteral antibiotics based on culture-sensitivity results. We encountered difficulty in reduction in two patients but got satisfactory results thereafter.

Two patients developed limb shortening <2 cm post-operatively due to technical errors in the form of the prosthesis not sitting properly over calcar due to large posteromedial defect.

SS wire breakage seen in two patients which was wired around the abductors and the shaft of femur. Patient is comfortably walking without any pain. One patient had develop aseptic loosening of prosthesis, but did not revert back on follow-up.

Graph 13 shows increase in average Harris hip score at 1 month, after 6 months, and after 1 year follow-up [Table 11].

In our study of 50 cases, 15 patients got excellent results, 24 patients got good results, 5 patients got fair results, and 2 patients got poor results [Table 12].

Four patients did not revert back on the final follow-up after 1 year.

Results of our study are comparable to other studies mentioned above [Table 13, Graphs 1-12, 14 and 15].

### Table 5: Mode of injury

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Mode of injury (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>Trivial fall (84)</td>
</tr>
<tr>
<td>8</td>
<td>RTA (16)</td>
</tr>
</tbody>
</table>

### Table 6: Hospitalization days

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Hospitalization days (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 (2)</td>
</tr>
<tr>
<td>3</td>
<td>6 (6)</td>
</tr>
<tr>
<td>15</td>
<td>7 (30)</td>
</tr>
<tr>
<td>12</td>
<td>8 (24)</td>
</tr>
<tr>
<td>6</td>
<td>9 (12)</td>
</tr>
<tr>
<td>13</td>
<td>10 (26)</td>
</tr>
</tbody>
</table>

### Table 7: Size of prosthesis

<table>
<thead>
<tr>
<th>Size of prosthesis (mm)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>3 (6)</td>
</tr>
<tr>
<td>43</td>
<td>10 (20)</td>
</tr>
<tr>
<td>45</td>
<td>22 (44)</td>
</tr>
<tr>
<td>47</td>
<td>12 (24)</td>
</tr>
<tr>
<td>49</td>
<td>3 (6)</td>
</tr>
</tbody>
</table>

### Table 8: Duration of surgery

<table>
<thead>
<tr>
<th>Duration of surgery</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 h 10 min</td>
<td>4 (8)</td>
</tr>
<tr>
<td>1 h 15 min</td>
<td>7 (14)</td>
</tr>
<tr>
<td>1 h 20 min</td>
<td>9 (18)</td>
</tr>
<tr>
<td>1 h 25 min</td>
<td>12 (24)</td>
</tr>
<tr>
<td>1 h 30 min</td>
<td>7 (14)</td>
</tr>
<tr>
<td>1 h 35 min</td>
<td>6 (12)</td>
</tr>
<tr>
<td>1 h 40 min</td>
<td>5 (10)</td>
</tr>
</tbody>
</table>

### Table 9: Blood loss in surgery

<table>
<thead>
<tr>
<th>Blood loss (ml)</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;200</td>
<td>38 (76)</td>
</tr>
<tr>
<td>200–400</td>
<td>10 (20)</td>
</tr>
<tr>
<td>&gt;400</td>
<td>2 (4)</td>
</tr>
</tbody>
</table>

### Table 10: Complications

<table>
<thead>
<tr>
<th>Immediate complication</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial infection</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Difficulty in reduction</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Hypotension</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Early complication</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Limb shortening</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Delayed complication</td>
<td></td>
</tr>
<tr>
<td>Wire breakage</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Aseptic loosening of implant</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

Complications

There were four cases who died due to medical complications earliest being 3-months post-operative period and late being
18 months. There were four cases of superficial operative site infection which were treated with a short course of oral antibiotics. There was no case of loosening of the prosthesis, break in the cement, or sinking of prosthesis. At follow-up progress and complications, if any, were noted and treated accordingly.

**DISCUSSION**

It is beyond doubt that implants such as dynamic hip screw, gamma nail, and other intra-medullary devices are the mainstay of treatment of intertrochanteric fractures.\[^{12,13}\] However, complications such as screw cutout, plate breakage, Z-effect, and reverse Z-effect are some of the implant-related complication encountered in unstable comminuted intertrochanteric femur fractures, mainly in osteoporotic and elderly patients.\[^{14,15}\] Maintenance of fracture reduction which should be anatomical or near anatomical, proper positioning of the implant, and monitored weight bearing are the pre-requisites to achieve good functional outcomes. However, in osteoporotic elderly patients with intertrochanteric comminuted fracture femur, the bone quality is poor, cut-out rates of implant are high, and loss of reduction is an known fact which leads to poor functional results. Furthermore, ambulation is prevented in elderly patients with fear of such complications, which in elderly patients causes other complications such as aspiration pneumonitis, bed sores, deep vein thrombosis, and atelectasis which gets further complicated with existing comorbidities.\[^{16}\] Hip fractures, hence, are most serious health-care problems affecting elderly patients. There were an estimated 1.66 million hip fractures worldwide in 1990, this worldwide annual number will rise to 6.26 million by the year 2050.\[^{15,16}\] Failure rates between 6% and 32% have been reported for internal fixation of both stable

---

**Table 11: Harris hip score progression**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>At 1 month</th>
<th>After 6 months</th>
<th>After 1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average HHS</td>
<td>62.42</td>
<td>80</td>
<td>85.15</td>
</tr>
</tbody>
</table>

**Table 12: Final Harris hip score**

<table>
<thead>
<tr>
<th>Harris hip score after 1-year follow-up</th>
<th>Number of patients</th>
<th>Results</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>91–100</td>
<td>15</td>
<td>Excellent</td>
<td>30</td>
</tr>
<tr>
<td>81–90</td>
<td>24</td>
<td>Good</td>
<td>48</td>
</tr>
<tr>
<td>71–80</td>
<td>5</td>
<td>Fair</td>
<td>10</td>
</tr>
<tr>
<td>&lt;70</td>
<td>2</td>
<td>Poor</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 13: Comparison with other studies**

<table>
<thead>
<tr>
<th>Study by</th>
<th>Number of cases</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chan et al.</td>
<td>55</td>
<td>19</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Haentenj et al.</td>
<td>37</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Sancheti et al.</td>
<td>37</td>
<td>8</td>
<td>16</td>
<td>6</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Our study</td>
<td>50</td>
<td>15</td>
<td>24</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
and unstable intertrochanteric hip.\textsuperscript{[17,18]} In our series, we had very few implant-related complication. Furthermore, we had no patients with complications such as bed sore, aspiration pneumonitis, or atelectasis as all the patients were immediately mobilized on the next day of operation. Several studies in the literature have shown that results with cemented bipolar hemiarthroplasty are good. It helps in early mobilization of a patient with good and
fast improvement in Harris hip score. Complications such as pressure sores, aspiration, and pneumonitis are very rare with this surgery. Cemented bipolar hemiarthroplasty has given constant good results in terms of early ambulation and good mid-term survival rates in comminuted unstable intertrochanteric fractures, and results are constant as compared to variable results given by osteosynthesis.[19-21] Even our results were synchronous to the above studies in terms of early mobilization, less implant-related complications, and faster overall rehabilitation.
There have been many case series and comparative studies which have compared results of osteosynthesis and cemented bipolar hemiarthroplasty for similar unstable intertrochanteric fractures. They have proved that final outcome in both the groups was more or less comparable except for the fact that there was early ambulation in hemiarthroplasty group. They have also stated that blood loss and need for transfusion were more in hemiarthroplasty group as compared to osteosynthesis. We do agree that blood loss and need for blood transfusion are more in this surgery. We had...
mean blood loss of 321 ml with minimum of 200 ml and maximum of 800 ml.

The rate of repeat operation in case series with osteosynthesis in elderly patients has been reported to be as high as 8–16%. Repeat surgeries in elderly patients with other comorbidities have shown more medical complications and implant-related complications. Our series had revision surgery 4.8% which is less than the osteosynthesis group.

We had used standard tension band wiring technique for fixation of greater trochanter as shown in case series by Zhang et al. In our series, we had encountered two delayed non-union of greater trochanter which was treated with repeat open reduction and fixation with circlage wire and bone grafting. Both patients presented clinically with pain at greater trochanter and decrease active abduction at follow-up of 4–5 months post-operatively.

Haentjens et al. and Geiger et al. in their case series showed dislocation rate in the patient group who underwent total hip arthroplasty was significantly higher (12–44.5%) than those who had bipolar arthroplasty (0–3.3%). We too had two (1.5%) patients who had got dislocated post-operatively. One of them was treated with closed relocation under anesthesia, and the other had to be treated with revision surgery in the form of total hip arthroplasty.

A study by George et al. has shown 10-year survivorship of cemented bipolar hemiarthroplasty in intertrochanteric fracture femur free of reoperation for any reason was 93.6%. We in our series have shown a good early to mid-term survivorship at our mean follow-up of 2.9 years with a minimum of 1 year and a maximum of 6 years.

The literature supports that all three approaches have comparable dislocation rates when using the posterior approach augmented with soft tissue repair and it is apparent an adequate soft tissue repair when performing the posterior approach greatly reduces the relative risk of dislocation. However, certain studies have also shown that there are higher rates of dislocation with posterior approach when compared with transtrochanteric and anterolateral approach. Studies have also shown that former has less rate of ectopic ossification as compared to the latter two. Furthermore, there is higher rate of non-union with transtrochanteric approach, thus affecting the abductor lever arm, and can lead to Lurching gait. We in our case series had implemented a novel transtrochanteric approach. We had selected all patients with comminuted intertrochanteric fracture femur which has greater trochanter as a separate fragment. We had to repair greater trochanter with tension band wiring irrespective of the approach used. Hence, we did not use Southern Moore's approach. As the greater trochanter fragment was elevated superoposteriorly, we saw the fracture neck and the head through the fracture site. Hence, there was neither need to cut external rotators which causes bleeding nor we had to split gluteus maximum or any of the abductors. Since we were constantly on lateral aspect, nerve was always safe posteriorly. Abovementioned were the advantages of this approach in comminuted intertrochanteric fractures. There were two cases of dislocation and two cases of non-union greater trochanter. We postulated that dislocation may be most probably due to inadequate version and possible...
non-union due to either cementing technique or inadequate fixation. However, the exact cause could not be ascertained.

Complexity of intertrochanteric fractures in elderly osteoporotic patients poses challenging problems with added risk of increased morbidity and mortality. Internal fixation of such fractures although may reduce the morbidity of pain, it does not permits early mobilization with fear of failure of fixation and thus indirectly the morbidity of fracture disease remains same. There are limitations of the use of internal fixation and their obvious complications in special cases where the patient is the elderly, bones are severely osteoporotic, and the fracture is unstable. The incidence of the fixation failure is reported to be as high as 20% in unstable fracture patterns.[31] Both, stability and early ambulation are only possible with cemented hemiarthroplasty.[32] In proximal femoral fractures with severe osteoporosis and poor bone stock, there is 100% risk of failure of fixation of any type.[31] Rate of failed fixation of compression hip screw is around 9.7%. There is a significant difference in osteoporosis grad between the failed and successful compression hip screw.[31] Kim et al.[33] reviewed 178 intertrochanteric fractures treated by DHS fixation. They used Singh’s index for the degree of osteoporosis and Evans classification for the stability of fracture. They found the failure of fixation in the form of varus angulation >100°, perforation of the femoral head, more than 20 mm of extrusion of a lag screw or metal failure, in 49 (27%) cases. In these 2 fractures were stable, and 47 were unstable. Thus, the conclusion was unstable fractures with osteoporosis had a failure rate of >50%, and in such cases, dynamic hip screw should not be the first choice of, if hip screw should not be the first choice of treatment.[33] Primary hemiarthroplasty offers a modality of treatment that provides adequate fixation and early mobilization in these patients, thus preventing postoperative complications such as pressure sores, pneumonia, atelectasis, and pseudoarthrosis.[32] As observed by the senior author and colleagues, cemented hemiarthroplasty with posterior approach, cutting the rotators, and increases the degree of posteromedial instability, with shattered greater trochanter, increases the risk of dislocation of the hip joint. Hence, approach was modified through the fracture site (lateral approach) removing the head and neck only, leaving the greater trochanter (shattered/intact) with rotators in situ, after reconstruction of greater trochanter (if shattered), maintains the posteromedial stability, and hence, obviates the risk of dislocation. Reconstruction of greater trochanter and calcar is an important step of surgery to maintain the stability of hip joint and to promote early ambulation with hip movements on D1 and walking with walker D7. Early mobilization is very essential particularly in patients with other medical comorbidities and to prevent postoperative complications.

In the short term, unipolar or bipolar hemiarthroplasty seems to give better results than open reduction and internal fixation in the treatment of unstable intertrochanteric hip fractures in terms of mortality and morbidity rates, complications, early rehabilitation and returning to daily living activities. Long-term problems such as loosening, protrusion, stem failure, late infections, and late dislocations have been prevalent. Since life expectancy increases in all countries, long-term disadvantages of the hemiarthroplasty may outweigh its short-term advantages.[34-38] Our series too have shown such complications and long-term survivorship of this implant would always be questionable despite its advantages.
LIMITATIONS

This study has several limitations such as: (1) No osteodensitometry scan was performed in our patients to assess bone density, and patients were deemed osteopenic on the basis of standard radiographs, (2) the Austin-Moore hemi-prosthesis that was used in patients over 85 years old was a bit old fashioned (comparing to bipolar hemi-prosthesis that were used in those under 85 years old), but our decision was mainly influenced by economic reasons and the low cost that Austin-Moore hemi-prosthesis presents (comparing to their counter-part); and (3) there was no control group of patients operated on with an osteosynthesis technique to make a proper comparison.

CONCLUSION

The proximal femoral fractures should be classified as stable and unstable, and the fracture should be graded according to the degree of osteoporosis. The proximal femoral fractures should be grouped according to fracture geometry so that correct choice of prosthesis can be used. The treatment of proximal femoral fractures in elderly patients with severe osteoporosis differs from the treatment of other proximal femoral fractures. These fractures are better treated with cemented hemiarthroplasty.

In the present study, primary hemiarthroplasty for the treatment of unstable pertrochanteric femoral fractures (AO/OTA type 31 A2.3) in elderly osteoporotic patients seems to be a secure and effective procedure, while showing an earlier ability to bear full body weight, a faster recovery rate, and an improved quality of life. This approach offered a suitable improved quality of life in terms of FIM and HHS. Early mobilization is advantageous in preventing pulmonary complications, venous thrombosis, pressure sores, and generalized deconditioning.

The treatment of these fractures with cemented hemiarthroplasty has the advantage of early ambulation and less hospital stay. The cemented hemiarthroplasty also provides stable, and mobile hip and revision surgery is hardly needed in these elderly patients. Implant should preferably have broad metaphyseal end, an long stem to enhance the stability. Cement (methyl-methacrylate) is a better fitting agent, and it improves the stability of hip. Thompson's prosthesis is a better choice when there is fractured calcar or in case when calcar reconstruction is not possible by anyway. The modular type of bipolar prosthesis is a better choice when there is communion of posteromedial wall with lesser trochanter and calcar fracture. The post-operative physiotherapy is very essential for earlier functional recovery. The weight bearing can be started earlier than in other methods of treatment.

REFERENCES

Mustafa, et al.: Functional Outcome of Primary Cemented Hemiarthroplasty


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Incidence, Severity and Early Outcome of Hypoxic-ischemic Encephalopathy among Newborns Born in a Rural Tertiary Care Centre in Southern India

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Abstract

Background: Hypoxic-ischemic encephalopathy (HIE) remains a great problem in developing countries. It occurs in 0.5% of live births of gestational age more than 36 weeks and accounts for 20% of perinatal deaths.

Objective: The aim of the study is to determine the incidence, severity and early outcomes of newborns born at tertiary care centre in southern India.

Methods: This study is a prospective study conducted among newborns with perinatal asphyxia for a period of 6 months from January 2017 to June 2017. The severity of HIE was classified by Sarnat and Sarnat staging. The asphyxiated babies were followed daily since birth to 7 days or until discharge, and the outcomes were noted.

Results: Out of 3130 term and near-term babies during the study period 2.7% (n = 84) had perinatal asphyxia. Among them 55% had mild HIE, 36% had moderate HIE, and 9% had severe HIE according to Sarnat and Sarnat staging. Out of 84 babies who had HIE, 4.8% (n = 4) babies died.

Conclusion: Incidence of perinatal asphyxia in our setting is little high. Morbidity and mortality of high initial score babies is very high. Good obstetric care and effective newborn resuscitation are vital in decreasing the occurrence of perinatal asphyxia and to improve the outcome of newborn babies.

Key words: Hypoxic-ischemic encephalopathy, perinatal asphyxia, sarnat and sarnat staging

INTRODUCTION

Perinatal asphyxia is a term which indicates impaired placental gas exchange leading to fetal hypoxemia and hypercarbia. Perinatal asphyxia contributes significantly to neonatal mortality accounting for nearly 20–25% of all neonatal deaths. It occurs in 0.5% of live newborn more than 36 weeks gestational age and accounts for 25% perinatal deaths.[¹]

According to Volpe, hypoxemia is defined as the “diminished amount of oxygen in the blood supply,” while cerebral ischemia is defined as the “diminished amount of blood perfusing the brain.” Cerebral ischemia is more important of the two forms of oxygen deprivation as it also leads to glucose deprivation. The terms hypoxia-ischemia and asphyxia are often used interchangeably, but from a pathophysiological viewpoint, they are not equivalent.[²]

Hypoxic ischemic encephalopathy (HIE) also known as hypoxic-ischemic brain damage (HIBD) and hypoxic-ischemic reperfusion brain injury[³] is one of the most serious conditions affecting the neonatal central nervous system. HIE is an abnormal behavioral state that consists of decreased level of consciousness and other signs of brainstem or motor dysfunction.
Recent studies have shown that in addition to hypoxic-ischemic insult reperfusion and reoxygenation that occurs following resuscitation also plays an important role in causing injury to the neurons. HIE accounts for significant neonatal morbidity and mortality and also results in long-term neurodevelopmental sequelae causing cerebral palsy. Perinatal asphyxia usually leads to multiorgan system damage; other organ systems are affected well before the central nervous system.

Severe birth asphyxia was defined as an APGAR score of 0–3 and a score of 4–7 was labeled mild to moderate birth asphyxia. Most neonates’ manifest symptoms within the first 12 h and the symptoms progress till 72 h to 5 days of age, with a brief period of improvement between 12 and 24 h.

The countdown report of 2015 estimated that neonatal deaths account for 45% of the 5.9 million child deaths that occurred in 2015 globally. In spite of advances in technology, better obstetric and neonatal care and a deeper understanding of the pathophysiology of perinatal asphyxia, HIE is still a major cause of mortality and neurodevelopment disability and current clinical management of the hypoxic-ischemic newborn infant is still limited to supportive measures.

MATERIALS AND METHODS

Study Design
This study design was a prospective study.

Study Period
This study was conducted from January 2017 to June 2017 for a period of 6 months.

Place of Study
A rural tertiary care centre at southern India Government Theni Medical College, Theni, Tamil Nadu, India.

Inclusion Criteria
All babies with gestational age >or = 36 weeks with Apgar score <7 at 5 min are included in our study. Gestational age of babies was assessed from maternal last menstrual period and/or early antenatal ultrasound.

Exclusion Criteria
1. Preterm babies with gestational age <36 weeks
2. Babies with major congenital malformation/anomalies.

Methodology
Babies with asphyxia were assessed by Sarnat and Sarnat staging. They were classified according to Sarnat and Sarnat scoring system. The enrolled babies were assessed by 8 tools in Sarnat and Sarnat scoring criteria. Accordingly, they were classified as mild HIE, moderate HIE, and severe HIE with the score of 1–10, 11–14, and 15–22, respectively.

Data such as maternal age at gestation, mode of delivery, duration of delivery, birth weight, and any birth complications were collected.

The enrolled babies were followed up since birth till 7 days of postnatal life or till discharge whichever is earlier and the severity and outcome of the babies were studied. Treatments given were oxygen, intravenous fluids, anticonvulsants, mechanical ventilation, and other supportive measures. Therapeutic cooling is not available in our setup.

RESULTS

During the study period of 6 months (January 2017–June 2017) a total of 3507 babies were delivered with near-term and term babies of about 3130. Among them, 84 babies had birth asphyxia (Apgar Score <7 at 5 min), and they are enrolled for our study. The incidence of birth asphyxia among near-term and term babies in our study is 2.7%.

In our study, among the 84 babies, 35% (n = 29) are <2.5 kg and 65% (n = 55) are >2.5 kg [Table 1 and Figure 1]. Among the 84 newborns, 62% (n = 52) are male babies and 38% (n = 32) are female babies [Table 2 and Figure 2].

Among these 84 babies, the mode of delivery is as follows: 5 babies by elective cesarean section, 29 babies by emergency cesarean section, 44 babies by normal vaginal delivery, 2 babies by breech delivery, and 4 instrumental delivery. Among these, Emergency caesarean section alone accounts for 35% (n=29) [Table 3 and Figure 3].

These babies are classified by Sarnat and Sarnat scoring system. Among them 55% (n = 46) developed mild HIE,
Selvakumar, et al.: Early Outcome of HIE Babies

36% (n = 30) developed moderate HIE, and 9% (n = 8) developed severe HIE. There are 4 deaths in the enrolled population. Among these deaths, all the babies are in severe HIE stage. There are no deaths among mild HIE and moderate HIE group.

**DISCUSSION**

In our study, the incidence of HIE among term and near-term babies is around 2.7%. State of Newborn Health in India states that the reported incidence varies from 2% to 16.2% in community-based studies.

Our study showed that among the 84 babies, 65% of babies were >2.5 kg and 35% were <2.5 kg. The study by Yelamali et al. stated that 51% of the babies >2.5 kg and 49% of the babies <2.5 kg.

In our study, 62% were male babies, male to female ratio is 1.6:1, which is similar to study conducted in Karnataka where male to female ratio is 1.8:1. Also in the study conducted by Be Yelamali et al. showed 65% were males and 35% were females. Another study conducted by Roopa et al. at Mahadevappa Rampure Medical College, Gulbarga, Karnataka, showed a gender predominance of 56% in males compared to 44% in females.

In our study among the 84 babies, 34 babies (40%) were delivered by cesarean section. In a study conducted
in Motilal Nehru Medical College, Allahabad, 65% of asphyxiated babies were born through assisted delivery.\textsuperscript{[9]} Chandra \textit{et al}. also observed cesarean section and breech delivery to be significantly associated with asphyxia.\textsuperscript{[10]}

Most of the babies in our study had mild HIE accounting for 55%. This is similar to the study conducted in The Government Medical College, Kozhikode, Kerala,\textsuperscript{[11]} where 56% of babies had mild HIE and another study conducted in northern Tanzania,\textsuperscript{[12]} where 50.8 % had mild HIE.

In our study, 95% of babies were discharged which is similar to the study conducted in Northern Tanzania\textsuperscript{[12]} and Pakistan.

**CONCLUSION**

Birth asphyxia is one of the most common causes of admission to NICU. In our center, there is a high incidence of emergency cesarean section (>35%) in the asphyxiated babies which shows the late referral of antenatal mothers from the peripheries. Early referral and adequate training regarding complicated labor to the peripheral centres can minimize the birth asphyxia and its related complications. Moreover, effective resuscitation and early intervention of asphyxiated babies will have a good outcome.

**REFERENCES**


**How to cite this article:** Selvakumar R, Vasanthamalar C, Deepthy SIJ. Incidence, Severity and Early Outcome of Hypoxic-ischemic Encephalopathy among Newborns Born in a Rural Tertiary Care Centre in Southern India. Int J Sci Stud 2017;5(8):63-66.

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A Clinical and Computed Tomography Scan Correlation In Patients With Advanced Ovarian Carcinoma

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Abstract

**Background:** Epithelial ovarian carcinoma (EOC) is the most lethal malignant disease; especially due to its advanced stage of diagnosis. Computed tomography (CT) scan screening and cancer antigen 125 are tried in patients for early diagnosis but do not have an impact on the survival. CT scan studies preoperatively are being used to identify predictability of optimal or suboptimal cytoreduction patients with EOC.

**Materials and Methods:** A retrospective study was conducted to correlate the CT scan findings and intra-operative findings of patients with advanced EOC of Stage III/IV undergoing cytoreduction. 42 patients undergoing surgical cytoreduction over a period of 9 years from a tertiary teaching hospital were included. Clinical data were obtained from earlier medical records. Pre-operative CT scan was done in all patients. Residual tumors identified measuring <1 cm were considered suboptimal cytoreduction.

**Results:** A total of 42 patients matching the inclusion criteria were included. On pre-operative CT scans, omental extension to the stomach or spleen and inguinal or pelvic lymph nodes >2 cm were predictors of suboptimal cytoreduction. Optimal cytoreduction <1 cm residual disease was achieved in 17 (40.47%) patients. Involvement of both omental extension and inguinal or pelvic lymph nodes had a positive predictive value of 85.29% in cytoreduction.

**Conclusion:** CT scan is the most valuable tool for the pre-operative prediction of successful resection of ovarian cancer during primary surgery. However, the CT-based pitfalls leading to suboptimal cytoreduction have to be identified with a larger study. The combination of omental extension to the stomach or spleen and involvement of inguinal or pelvic lymph nodes in pre-operative CT scans is considered predictive of suboptimal cytoreduction. These patients may be more appropriately treated with neoadjuvant chemotherapy followed by surgical cytoreduction.

**Key words:** Carcinoma, Computed tomography scan, Epithelial, Ovary, Peritoneal metastases

INTRODUCTION

Epithelial ovarian cancer is the most lethal of the gynecologic malignancies, largely due to the advanced stage at diagnosis in most patients. Screening strategies using ultrasound and the cancer antigen (CA) 125 tumor marker are currently under study and may lower stage at diagnosis but have not yet been shown to improve survival.

Women who have inherited a deleterious mutation in the BRCA1 or BRCA2 gene and those with the Lynch syndrome (hereditary nonpolyposis colorectal cancer) have the highest risk of developing ovarian cancer but account for only approximately 10% of those with the disease. Other less common and less well-defined genetic syndromes may increase the risk of ovarian cancer, but their contribution to genetic risk is small. A clear etiology for sporadic ovarian cancer has not been identified, but the risk is affected by reproductive and hormonal factors. Surgery has a unique role in ovarian cancer, as it is used not only for diagnosis and staging but also therapeutically, even in patients with widely disseminated, advanced disease. Ovarian cancer is highly sensitive to chemotherapy drugs, particularly the platinum agents, and most patients will attain a remission with initial treatment. Recent advances...
in the delivery of chemotherapy using the intraperitoneal route have further improved survival after initial therapy. Although the majority of ovarian cancer patients will respond to initial chemotherapy, most will ultimately develop disease recurrence. Chemotherapy for recurrent disease includes platinum-based, multiagent regimens for women whose disease recurs more than 6–12 months after the completion of initial therapy and sequential single agents for those whose disease recurs earlier. New targeted biologic agents, particularly those involved with the vascular endothelial growth factor pathway and those targeting the poly (ADP-ribose) polymerase enzyme, hold great promise for improving the outcome of ovarian cancer.

Ovarian neoplasms are classified according to the tissue of origin such as epithelium, stromal endocrine cells, and germ cells. Epithelial ovarian carcinoma (EOC) accounts for more than 90% of all ovarian malignancies. It is a disease of postmenopausal women, occurring most commonly in the sixth and seventh decades of life.[1] In the USA it is second most common after carcinoma of the uterus.[10] The lifetime incidence for ovarian malignancies is 1 in 12 (1.39%) and the lifetime risk of death from ovarian cancer is 1 in 96 (1.04%) for women living in the United States. The median age at diagnosis is 63 years.[13] One of the factors for greater mortality is its late diagnosis with more than 60% of patients presenting already with metastatic spread beyond the pelvis.[18] Hence, in spite of surgery or chemotherapy, the episodes of tumor recurrence will develop which needs to be monitored to enable early rescue.[19] Computed tomography (CT) scan can provide staging information for pre-operative planning and determination of surgical resectability, demonstrate tumor response to therapy, and allow detection of persistent or recurrent disease.[4] Review of literature shows extensive studies on the role of CT scan in the diagnosis of EOC. The reported pre-operative staging accuracy of CT is 70–90%.[5-7] CT is more sensitive than ultrasonography (US) for detection of abnormalities in the para-aortic lymph nodes, omentum, mesentery, and sub-diaphragmatic regions.[8] CT is a fast and widely available study, and it remains the most useful technique for pre-operative staging of ovarian cancer.[5] The basis of management of EOC in advanced stage is primary cytoreductive surgery followed by platinum-based chemotherapy. The extent of residual disease after primary cytoreductive surgery is an important predictor of prognosis.[8] However, the outcome of suboptimal cytoreduction is less evident.[18] Such patients may incur significant surgical morbidity without an associated gain in survival.[18] The present study was a review of medical records of patients who have undergone suboptimal cytoreduction for advanced stages of EOC and the role of CT scan in predicting the prognosis in a tertiary teaching hospital.

**Period of Study**
The study period was from March 2006 to February 2015 (9 years).

**Institute of Study**
This study was conducted at the Department of Radiology, Kannur Medical College, Anjarakandy, Kannur, Kerala.

**MATERIALS AND METHODS**
A retrospective study was undertaken by obtaining data from the medical records of the Department of Radiology about 42 patients who underwent cytoreduction surgery for advanced Stages III/IV stage of EOC. The demographic data were prepared using the records. Clinical features and pre-operative CT scan findings were noted.

**Inclusion Criteria**
1. Patients aged 45–90 years were included.
2. Patients with EOC of Stage III/IV were included.
3. Patients with CT scan done within 4 weeks of surgery only were included.

**Exclusion Criteria**
1. Patients aged below 50 and above 90 years were excluded.
2. Patients undergoing neoadjuvant chemotherapy were excluded.
3. Patients without CT scan reports were excluded.

CT scan findings included were large-volume ascites, pleural effusion, diffuse peritoneal thickening, omental cake, omental extension to the spleen or stomach, suprarenal lymph nodes larger than 1 cm, infrarenal or inguinal lymph nodes larger than 1 cm, and tumor implants larger than 2 cm on small and large bowel mesentery, peritoneum, diaphragm, liver, or porta hepatis. Patients undergoing cytoreduction were subjected to standard abdominal midline laparotomy, and extensive resection of the adnexa as per guidelines was done leaving no macroscopic residual tumor or <1 cm residual disease. Along with total abdominal hysterectomy, bilateral salpingo-oophorectomy, total omentectomy, and appendectomy were done. Whenever necessary, multiple frozen sections were done. Additional surgeries when required were undertaken such as large bowel resections, small bowel resection, diaphragm stripping, splenectomy, and abdominopelvic peritoneal resection. Systematic pelvic and para-aortic lymphadenectomy were performed. The CT scan findings were correlated with intra-operative findings. Diffuse peritoneal thickening was defined as thickening ≤4 mm involving at least two of the five following areas: Lateral colic gutters, lateral conal fascia, anterior abdominal wall, diaphragm, and pelvic peritoneal reflections. Optimal
cytoreduction was defined as <1 cm residual disease. The clinical data also included age, CA-125 serum levels 4 weeks before surgery. Postoperatively, all patients received taxane/platinum combination chemotherapy for six to eight cycles. Follow-up information was recorded until the date of last contact or death. Survival time was calculated from the date of last chemotherapy to the date of last contact or death.

**RESULTS**

Out of 42 patients, 2 (4.76%) were below 50 years, 6 were between 50 and 60 years, 13 (30.95%) were 60–70 years, 15 (35.71%) were between, and 5 (11.90%) were between 80 and 90 years old. The mean age of 8 (19.04%) was 65.30 ± 1.75 years. The serious type of EOC was observed in 27 patients, transitional cell type in 5 (11.90%), endometrioid type in 6 (14.28%), and mixed type in 4 (09.52%) patients. Optimal cytoreduction was undertaken in 11 (26.19%) patients and sub-optimal cytoreduction in 31 (73.80%) patients. The laboratory serum levels of CA-125 were <500 U/mL were observed in 16 (38.09%) and >500 <500 U/mL were observed in 26 patients (61.90%) [Table 1].

Cytoreduction was optimal in 17 (40.47%) patients and was suboptimal in 25 (59.52%) patients [Table 2].

There were no statistically significant differences in median age 68.45 ± 1.50 in optimal and 63.30 ± 1.65 in suboptimal groups. Similarly, there was no significance in CA-125 values of both the groups; the mean values in optimal group was 945 ± 5.60 and 1054 ± 6.10 in the suboptimal group; P value was more than 0.05 (P value taken significant at below 0.005) [Table 3].

CT scan findings were correlated with the intra-operative findings in relation to the anatomical sites involved with the disease. The different sites of involvement were tabulated [Table 4]. Out of 14 different anatomical sites, omental extension to stomach and spleen was present in 14/17 (82.35%) of optimal group, and 20/25 (80%) of suboptimal group with a total of 34/42 (80.95%) patients. Inguinal or pelvic lymph nodes were present in 15/17 (88.23%) of optimal group and 21/25 (84%) of the suboptimal group out of a total of 36/42 (85.71%) patients. All other sites were almost equally in both optimal and suboptimal groups. These two sites had a positive predictive value (PPV) of 85.29% in cytoreduction [Table 4].

**DISCUSSION**

In this retrospective study, an attempt is made to select 42 patients with Stage III/IV EOC disease and correlate the pre-operative CT scan findings to observe the anatomical sites involved with the actual involvement during surgery. The patients are divided into optimal and suboptimal groups depending on the cytoreduction achieved after surgery. The role of CT scan in predicting the suboptimal cytoreduction in future patients was mad. Even though such pretreatment evaluation of ovarian cancer is controversial because both staging and tumor debulking are undertaken at the time of exploratory laparotomy; however, cross-sectional imaging can provide staging information that may help in pre-operative planning. Pre-operative neoadjuvant chemotherapy has been used recently in patients with Stage III/IV disease, and CT scans can help identify those patients who may benefit from pre-operative neoadjuvant chemotherapy. The reported pre-operative staging accuracy of CT is 70%–90%. In this study, CT scan showed PPV of 85.29%. CT scan was commented as more

<table>
<thead>
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<th>n (%)</th>
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<tbody>
<tr>
<td>Age (years)</td>
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<tr>
<td>&lt;50</td>
<td>02 (4.76)</td>
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<td>60–70</td>
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<td>80–90</td>
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<tr>
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<td>III C</td>
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<td>IV</td>
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<tr>
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<tr>
<td>Mixed</td>
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<tr>
<td>Optimal cytoreduction</td>
<td>11 (26.19)</td>
</tr>
<tr>
<td>Suboptimal cytoreduction</td>
<td>31 (73.80)</td>
</tr>
<tr>
<td>CA-125 levels (U/mL)</td>
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<tr>
<td>&lt;500</td>
<td>16 (38.09)</td>
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<tr>
<td>&gt;500</td>
<td>26 (61.90)</td>
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EOC: Epithelial ovarian carcinoma, CA-125: Cancer antigen-125

<table>
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<tr>
<td>Cytoreduction</td>
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<td>Optimal</td>
<td>17 (40.47)</td>
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<tr>
<td>Suboptimal</td>
<td>25 (59.52)</td>
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</table>

<table>
<thead>
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<th>Mean values of observations</th>
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<th>Suboptimal group</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>68.45±1.50</td>
<td>63.30±1.65</td>
<td>0.072</td>
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<tr>
<td>CA-125 levels</td>
<td>945±5.60</td>
<td>1054±6.10</td>
<td>0.086</td>
</tr>
</tbody>
</table>

CA-125: Cancer antigen 125, SD: Standard deviation
sensitive than the US for detection of abnormalities in the para-aortic lymph nodes, omentum, mesentery, and sub-diaphragmatic regions. CT scan is also useful in detecting persistent or recurrent ovarian cancer and demonstrates tumor response to subsequent therapy. In one study, sensitivity and specificity of CT scan performed before second-look surgery was 59%–83% and 83%–88%, respectively. A major limitation of both CT and magnetic resonance imaging is relatively poor sensitivity for detection of small tumor implants, especially on the small intestine or mesentery, this limitation is related to the natural history of metastatic ovarian cancer. If CT shows evidence of residual or recurrent tumor, unnecessary second-look laparotomy can be avoided in over 20% of patients subjected to second-look surgery with current restaging methods. As there is improvement in CT scan techniques including spiral CT the detection of small peritoneal implants also has improved; recent studies show that CT allows detection of 50% of peritoneal implants as small as 5 mm in diameter located in the sub-phrenic regions or profiled by ascites and 28% of implants smaller than 5 mm in diameter. There were some limitations to this study. First, this was a retrospective analysis of a single-center cohort of patients with advanced EOC. The most important predictors vary between institutions depending on surgical practice and cytoreduction rates, so present study results may not be applicable to other institutions and surgeons.

CONCLUSIONS

CT scan is the most valuable tool for the pre-operative prediction of successful resection of ovarian cancer during primary surgery. However, the CT scan based pitfalls leading to suboptimal cytoreduction have to be identified with a larger study. The combination of omental extension to the stomach or spleen and involvement of inguinal or pelvic lymph nodes in pre-operative CT scans can be considered predictive of suboptimal cytoreduction. These patients may be more appropriately treated with neoadjuvant chemotherapy followed by surgical cytoreduction.

REFERENCES


<table>
<thead>
<tr>
<th>Table 4: Univariate analysis of CT scan findings of optimal and suboptimal groups (n=42)</th>
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</thead>
<tbody>
<tr>
<td><strong>CT scan findings</strong></td>
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<tr>
<td></td>
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<tr>
<td>Diaphragm disease &gt;2 cm</td>
</tr>
<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Liver implants</td>
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<td>Present</td>
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<td>Absent</td>
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<tr>
<td>Porta hepatis or gallbladder fossa disease</td>
</tr>
<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Diffuse peritoneal thickening</td>
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<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Peritoneal implants &gt;2 cm</td>
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<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Large-volume ascites</td>
</tr>
<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Large bowel mesentry implants &gt;2 cm</td>
</tr>
<tr>
<td>Present</td>
</tr>
<tr>
<td>Absent</td>
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<tr>
<td>Small bowel mesentry implants &gt;2 cm</td>
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<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Omental extension to stomach or spleen</td>
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<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Omental cake</td>
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<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Suprarenal lymph nodes &gt;1 cm</td>
</tr>
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<tr>
<td>Absent</td>
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<tr>
<td>Intra-renal lymph nodes &gt;1 cm</td>
</tr>
<tr>
<td>Present</td>
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<tr>
<td>Absent</td>
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<tr>
<td>Pleural effusion</td>
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<td>Present</td>
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CT: Computed tomography
Sheethal: Clinical and CT Scan Correlation of Ovarian Carcinoma


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A Hospital Based Study on Correlation between Transvaginal Sonography and Histopathological Pattern in the Diagnosis of Adenomyosis

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Abstract

Background: Adenomyosis is a common benign disease of the uterus with an incidence of 5–70% in combined surgical and postmortem specimens. It may be diagnosed using transabdominal ultrasonography, transvaginal ultrasonography (TVS), or magnetic resonance imaging.

Aim of the Study: The aim of the study was to study the different transvaginal sonographic criteria for diagnosing adenomyosis and to correlate the most useful criteria with histopathology results in the diagnosis of adenomyosis.

Materials and Methods: A total of 65 patients undergoing hysterectomy for were subjected to pre-operative transvaginal sonography using certain criteria for the diagnosis. The criteria for the diagnosis were globular uterine configuration, poor definition of the endometrial-myometrial interface, sub-endometrial echogenic linear striations, myometrial anterior-posterior asymmetry, myometrial cysts, and a heterogeneous myometrial echotexture. The results were compared with the histopathology of the specimen obtained after surgery.

Observations and Results: A total of 65 patients included in the present study who were undergoing hysterectomy were aged between 26 and 68 years with a mean age of 47.45 ± 2.50. The specimen was positive for adenomyosis in 35.65 (53.84%) hysterectomy specimen and negative for adenomyosis in 30.65 (46.15%). There was statistical significance with all the ultrasound criteria except poor definition of the endometrial-myometrial interface and myometrial cysts correlating with histopathology of adenomyosis (P at 0.806).

Conclusions: TVS is a useful preliminary work tool in the diagnosis of adenomyosis. Globular uterine configuration, sub-endometrial echogenic linear striations, heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry were significant criteria in the diagnosis of adenomyosis.

Key words: Adenomyosis, Histopathology, Transvaginal, Ultrasound

INTRODUCTION

Adenomyosis is a common benign disease of the uterus with an incidence of 5–70% in surgical and postmortem specimens combined.[1,2] It occurs when there is disruption between the normal endometrial basal layer and the myometrium.[1] The cause may be due to uterine trauma, pregnancy, postpartum endometritis, or cesarean delivery. The endometrial glands invade the myometrium, resulting in ectopic intramyometrial glands associated with adjacent myometrial hypertrophy.[2] Whereas an adenomyoma is a focal form of adenomyosis and may be difficult to distinguish from uterine leiomyoma on imaging.[3] The later coexist with adenomyosis in 36-50% of cases.[1] The incidence of endometrial hyperplasia and carcinoma has also been reported to occur with greater frequency in women with adenomyosis; which may be explained by the hormonal influence.[4] The diagnosis adenomyosis remains elusive, but the use of sonography and MR imaging help with high sensitivities in high-prevalence populations.[5,6] Review of literature shows high sensitivities and specificities of 87% and 98%, respectively, with transvaginal sonography.
in the diagnosis of adenomyosis.\textsuperscript{8-10} As the initial imaging is by ultrasonography in the diagnosis of adenomyosis patients, improving the skills of sonography is important to the gynecologists. In this context, the present study is conducted to correlate the transvaginal sonography with histopathological features of adenomyosis. Pre-operative sonography in adenomyosis is also important because the disease is usually overlooked especially in the presence of a fibroid uterus. Management, such as planning for myomectomy for uterine preservation, may be altered if extensive adenomyosis is suspected.

**Period of Study**
This study period was from July 2004 to June 2007 (3 years).

**Institute of Study**
Department of OBG, General Hospital attached to Kurnool Medical College, Kurnool, Andhra Pradesh.

**MATERIALS AND METHODS**
A total of 65 patients attending the Department of OBG, Kurnool Medical College Hospital, Kurnool, Andhra Pradesh, with adenomyosis were included in the study. An Institutional Ethical Committee clearance certificate was obtained, and committee approved consent form was used for the study. This was a prospective cross-sectional study.

**Inclusion Criteria**
1. Patients undergoing hysterectomy for dysmenorrhea, menometrorrhagia, cervical intraepithelial neoplasias, adnexal masses, genital prolapse, and endometrial hyperplasia or carcinoma of cervix, or uterus.
2. Patients of all age groups were included.

**Exclusion Criteria**
1. Patients without the indications mentioned above were excluded
2. Patients not giving for the consent were excluded.

The radiologist was blinded as to the indication for hysterectomy. The pathologist was blinded to the clinical diagnosis and ultrasound reports of the patient. The same radiologist and pathologist conducted the study throughout the period. Demographic data were obtained from the patients. A thorough clinical history taking and gynecological examination was done and the data collected.

The patients were subjected to transvaginal sonography before proceeding to hysterectomy. A 7-9 MHZ endovaginal probe was used with a GE ultrasound machine. During the procedure, the myometrial echotexture, uterine borders (regular or irregular), uterine size, and the presence of associated abnormalities (associated leiomyoma) were noted. The criteria used were:

1. Globular uterine configuration
2. Poor definition of the endometrial-myometrial interface
3. Sub-endometrial echogenic linear striations
4. Myometrial anterior-posterior asymmetry
5. Myometrial cysts (1–7 mm)
6. Heterogeneous myometrial echotexture.

All the reports given by the radiologist were re-evaluated by the author before proceeding to hysterectomy. Hysterectomy was carried out by the standard textbook descriptions. The surgical specimen was examined for macroscopic appearance (1) enlarged uterus, (2) a globular and/or asymmetrical uterus, (3) a dense, irregularly fasciculated myometrium with small cavities (0.5–10 mm), and (4) uterine size; fundus, anterior, posterior, right, and left maximal uterine wall thickness were measured. The numbers of slides prepared were based on the thickness of the myometrium (4–8 slides). Macroscopically adenomyosis was reported when a circumscribed nodular lesion was noted. Focal adenomyosis (localized adenomyosis) was defined by the presence of adenomyotic lesions restricted to one uterine wall. The criteria used for histopathology diagnosis were (1) presence of endometrial glands and/or tissues within the myometrium, (2) ectopic glands situated 2.5 mm beyond the endometrial-myometrial junction. The results were graded depending on the depth of myometrium involvement as Grades 1 (inner one-third), 2 (two-thirds), and 3 (entire myometrium). Grading was also done depending on the islets of endometrium present in the myometrium: Grade I (1–3 islets), Grade II (4–9 islets), and Grade III (>10 islets). All the data were analyzed using standard statistical methods.

**OBSERVATIONS AND RESULTS**
A total of 65 patients included in the present study who were undergoing hysterectomy were aged between 26 and 68 years with a mean age of 47.45 ± 2.50. 37 patients (56.92%) belonged to the age group of 35–55 years followed by the age group 25–35 years with 14 (21.53%) patients. The specimen was positive for adenomyosis in 35/65 (53.84%) hysterectomy specimen and negative for adenomyosis in 30.65 (46.15%). The age groups were compared for these two groups and found to be not significant statistically ($P = 0.331$; with $P$ taken as significant at $<0.05$). [Table 1]. Similarly, the parity was compared for the two groups and was found to be not significant ($P = 0.190$). Whereas the symptoms of dysmenorrhea ($P = 0.002$), menometrorrhagia ($P = 0.004$), myomas ($P = 0.034$), and menopause ($P = 0.01$) were statistically significant in both the groups [Table 1].
Each criterion of ultrasound pelvis indicating the possible diagnosis of adenomyosis preoperatively were compared with the actual histopathology report of the specimen after hysterectomy and found that there was statistical significance with all the criteria except poor definition of the endometrial-myometrial interface and myometrial cysts ($P$ at 0.806), [Table 2]. Whereas the other criteria were statistically significant in assessing the diagnosis of adenomyosis with $P < 0.05$, [Table 2].

The overall sensitivity of intravaginal ultrasound in the diagnosis of adenomyosis was 69.95%, and specificity was 71.20%.

### DISCUSSION

Adenomyosis is a common gynecological disorder in clinical practice. It is overlooked otherwise accounts for 70% of the hysterectomy specimen all over the world. Transvaginal ultrasound (TVS) has been used for the diagnosis of adenomyosis.$^{[11]}$ The incidence reported in the literature varies from 5% to 70%.$^{[12]}$ The reported incidence varies widely from 5% to 70%.$^{[13]}$ Meredith et al.$^{[14]}$ reported the role of TVS in assessing the adenomyosis and they found it was accurate as a diagnostic tool. TVS is a non-invasive procedure and can be adopted as a first line investigative procedure in diagnosis of adenomyosis, but the disadvantage is that it is operator dependent. In this study, the prevalence of adenomyosis among the hysterectomy specimen was 35.65 (53.84%). Bazot et al.$^{[15]}$ in their study comparing trans abdominal and TVS held the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy of TVS were 65%, 97.5%, 92.8%, and 88.8%, respectively. Whereas Reinhold et al.$^{[16]}$ reported a specificity of 86% for TVS. Kepkepk et al.$^{[17]}$ in their study mentioned that the sensitivity, specificity, positive (PPV), and negative (NPV) predictive values and accuracy of TVS for the diagnosis of adenomyosis were 80.8%, 61.4%, 55.3%, 84.4%, and 68.6%, respectively. In this study, the sensitivity and specificity were 69.95% and specificity was 71.20%, respectively. The difference in accuracy in various studies is due to the criteria used for the diagnosis of adenomyosis were different. But in most of the studies the most common criteria were heterogeneous myometrial echotexture, and in the present study also it was used. Bromley et al.$^{[18]}$ from their study published the following criteria: 95% with globular uterus,

### Table 1: Correlation between clinical symptoms and histopathology reports ($n=65$)

<table>
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<tr>
<th>Observation</th>
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<th>Yes - 35</th>
<th>No - 30</th>
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<tr>
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</tr>
<tr>
<td>25–35-14</td>
<td></td>
<td>08</td>
<td>06</td>
<td>23.50±0.45</td>
<td></td>
</tr>
<tr>
<td>35–45-22</td>
<td></td>
<td>12</td>
<td>10</td>
<td>32.75±0.70</td>
<td>0.331</td>
</tr>
<tr>
<td>45–55-15</td>
<td></td>
<td>08</td>
<td>07</td>
<td>44.05±1.05</td>
<td></td>
</tr>
<tr>
<td>55–65-11</td>
<td></td>
<td>05</td>
<td>06</td>
<td>51.40±1.10</td>
<td></td>
</tr>
<tr>
<td>65–75-03</td>
<td></td>
<td>02</td>
<td>01</td>
<td>63.30±2.40</td>
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<tr>
<td>Parity - NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–08</td>
<td></td>
<td>04</td>
<td>04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–16</td>
<td></td>
<td>08</td>
<td>08</td>
<td></td>
<td>0.190</td>
</tr>
<tr>
<td>2–17</td>
<td></td>
<td>10</td>
<td>07</td>
<td>2.15±0.25</td>
<td></td>
</tr>
<tr>
<td>3–16</td>
<td></td>
<td>09</td>
<td>07</td>
<td>2.50±0.35</td>
<td></td>
</tr>
<tr>
<td>4–08</td>
<td></td>
<td>05</td>
<td>03</td>
<td>3.15±0.60</td>
<td></td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td></td>
<td>33 (94.28)</td>
<td>09 (30)</td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td></td>
<td>25 (71.42)</td>
<td>12 (40)</td>
<td></td>
<td>0.004</td>
</tr>
<tr>
<td>Myomas</td>
<td></td>
<td>12 (34.28)</td>
<td>15 (50)</td>
<td></td>
<td>0.034</td>
</tr>
<tr>
<td>Menopause</td>
<td></td>
<td>03 (8.5)</td>
<td>06 (20)</td>
<td></td>
<td>0.01</td>
</tr>
</tbody>
</table>

### Table 2: The correlation between ultrasound criteria histopathology of adenomyosis ($n=65$)

<table>
<thead>
<tr>
<th>Ultrasound criteria</th>
<th>Histopathology of adenomyosis</th>
<th>Positive 35 (%)</th>
<th>Negative 30</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globral uterine configuration</td>
<td></td>
<td>18–51.42</td>
<td>08–26.6</td>
<td>0.09</td>
</tr>
<tr>
<td>Poor definition of the endometrial-myometrial interface</td>
<td></td>
<td>17–48.17</td>
<td>22–73.33</td>
<td></td>
</tr>
<tr>
<td>Sub-endometrial echogenic linear striations</td>
<td></td>
<td>21–60</td>
<td>12–40</td>
<td>0.806</td>
</tr>
<tr>
<td>Myometrial anterior-posterior asymmetry</td>
<td></td>
<td>14–40</td>
<td>18–60</td>
<td></td>
</tr>
<tr>
<td>Myometrial cysts &gt;0.99</td>
<td></td>
<td>32–91.42</td>
<td>08–26.6</td>
<td>0.045</td>
</tr>
<tr>
<td>Heterogeneous myometrial echotexture</td>
<td></td>
<td>03–08.5</td>
<td>22–73.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>21–60</td>
<td>07–23.33</td>
<td>0.478</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14–40</td>
<td>23–76.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>25–71.42</td>
<td>17–56.66</td>
<td>0.806</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10–28.57</td>
<td>13–43.33</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>26–74.28</td>
<td>15–50</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td></td>
<td>09–25.71</td>
<td>15–50</td>
<td></td>
</tr>
</tbody>
</table>
82% with small myometrial lucent areas, and 82% with an indistinct endometrial stripe. In this study, the same criteria showed incidence of 78.02%, 71.42%, and 91.42%, respectively. Kepkep et al.[17] were of the opinion that a globular appearing uterus, sub-endometrial echogenic linear striations, and myometrial cysts had the highest accuracy for the diagnosis of adenomyosis. In this study, poor definition of the endometrial-myometrial interface and myometrial cysts as the criteria for the diagnosis of adenomyosis was not specific or sensitive and also statistically not significant [Table 2]. There is a debate as to whether magnetic resonance imaging (MRI) is significantly better than TVS in the diagnosis of adenomyosis. Ascher et al.[18] opine that MRI is significantly better than TVU (P < 0.02) for diagnosing adenomyosis. However, Reinhold et al.[16] found that TVU was as accurate as MRI in the diagnosis of uterine adenomyosis.

CONCLUSIONS

TVS is a useful preliminary work tool in the diagnosis of adenomyosis. Globular uterine configuration, sub-endometrial echogenic linear striations, heterogeneous myometrial echotexture, and myometrial anterior-posterior asymmetry were significant criteria in the diagnosis of adenomyosis. These criteria yielded better results than poor differentiation between endometrium and myometrium and myometrial cysts.

REFERENCES

A Study of Occurrence of Frailty in Patients of Chronic Obstructive Pulmonary Disease and its Correlation with the Cognitive Function as Assessed by Montreal Cognitive Assessment Score

Amit Kumar Verma, Dhirendra Kumar Singh

Abstract

Introduction: With increasing life expectancy the diseases of elderly age group such as COPD and frailty are more common nowadays than before. COPD is closely related with frailty with shares common risk factors such as smoking, aging, common mechanism of deregulated inflammation, and endocrine dysfunction. Frailty can be defined as a biological syndrome in which a progressive cumulative decline in the reserve capacity of multiple physiological systems illicit an abnormal vulnerability to normal strainers. It is defined as fried phenotype, meeting three or more of five established criteria.

Aim of this Study: To find out the occurrence of frailty in patients of COPD and find out correlation of frailty with cognitive impairment in patients with COPD if any.

Materials and Methods: In this one point observational study conducted in chest OPD of UCMS and associated hospital, Delhi. Diagnosis of COPD was made using GOLD 2016 guidelines. Frailty was defined on the basis of Fried criteria. MOCA test (Hindi version) was applied for assessment of cognitive function.

Study Duration: The study duration was August 2016-July 2017.

Sample size: In this study, 80 patients who satisfying the criteria were enrolled.

Result: Out of 80 patients, 61 were males and rests were females. Among them, 63 (78%) patients had diagnosis of frailty. The mean age among frail group was 62.29 ± 10.06 and among non-frail was 51.82 ± 10.98 years. Out of 63 patients with frailty only 3 (4.7%) has MOCA score ≥26 (i.e., normal) and around 17 patients of COPD without frailty only 1 (5.8%) has MOCA score ≥26. Remaining have MOCA score <26, which can be interpreted as the presence of cognitive impairment. P value of this data comes out to be 1.00 which is statistically not significant.

Conclusion: Frailty is a common occurrence in COPD patients, but for correlating with cognitive impairment larger sample size is needed.

Key words: Chronic obstructive pulmonary disease, Handgrip strength, Montreal cognitive assessment score, Frailty

INTRODUCTION

With advancement in the medical field in the 21st century, the lifespan of Indian population has been increased from 32 years at the time of independence to 68.7 years. It means that more and more peoples are now turning to elderly age group and more suffer from diseases with are prevalent in elderly age group such as COPD and frailty. COPD is reported to have an estimated disease burden of 210 million worldwide. Globally, COPD was the fourth leading cause of death (5.1%) in 2004 and is projected to occupy the third position (8.6%) in 2030. Furthermore, COPD is a major cause of chronic morbidity; it was ranked 11th in 2002 and is projected to rise to 7th place in 2030. By definition, COPD is the common preventable, treatable disease that is characterized by persistent respiratory...
Verma and Singh: COPD and Frailty and its Association with Cognitive Function

symptoms and airflow which is due to airway and alveolar abnormalities usually caused by significant exposure to noxious particles and gases.

Diagnosis of COPD requires post-bronchodilator pulmonary function test (PFT) FEV$_1$/FVC <0.7 and FEV$_1$ value <80% of normal for that age/gender/ethnicity. The guidelines issued by global initiative for chronic lung disease (GOLD)\cite{4} assigns patients with COPD into four groups based on the degree of airflow obstruction, symptoms score (COPD assessment test -CAT), and number of exacerbations in 1 year. This grading system uses objective spirometry and subjective symptoms.

COPD often presents with various symptoms of other body system involvement such as cardiovascular, gastrointestinal, neurological, musculoskeletal, and psychiatric symptoms. Hence, identification and management of these other system illness are key elements in COPD management. In contrast to organ-specific diagnosis and treatment in COPD frailty represents a generalized functional form of physical inability. It can be discussed as a biological syndrome in which a progressive cumulative decline in the reserve capacity of multiple physiological systems illicit an abnormal vulnerability to normal strainers.

Frailty is defined using the fried phenotype as meeting three or more of five established criteria. For example, nutritional status, physical activity, mobility, strength, and energy. Individuals with two or less criteria are defined as an intermediate form or prefrail, and about 25% of the will become frail by next 3 years.

COPD is also a disease of the fourth decade or more coincident with frailty occurrence. It is closely related with frailty with shared risk factors, for example: Aging, smoking and common mechanism of deregulated inflammation and endocrine dysfunction.

Prevalence of frailty in respiratory impaired persons was 5.8% using fried phenotypes and in COPD participants 57.8% using a frailty index. Frailed COPD patients are more disabled than non-frail. COPD patients have more problems in managing their day-to-day life activities including inhaler taking. Hence, it will be beneficial for the patients to find out which is frail and protect them from adverse risk. To add on cognitive impairment in COPD can be found in up to 77% patients with hypoxemia.\cite{6} Several aspects of disease contribute to impaired cognitive function including hypoxemia and comorbid cardiovascular diseases. It is also suggested that impaired performance in neuropsychiatric tests may be a predictor of mortality and disability in certain COPD population.\cite{7} Out of many studies, we could not found such studies being done on Indian patients and particularly in patients presenting in this part of the world, hence we planned this study.

Aim

1. To find out occurrence of frailty in patients of COPD.
2. To find out correlation of frailty with cognitive impairment in patients with COPD if any.

MATERIALS AND METHODS

In this one point, observational study conducted in chest OPD of University College of Medical Sciences and associated hospital, Dilshad Garden Delhi. Diagnosis of COPD was made using post-bronchodilator PFT, CAT score, mMRC score, and history of exacerbations in past 1 year as described in GOLD 2016 guidelines. Frailty was defined on the basis of previously validated frailty criteria originally reported by Fried et al, and modified by Wilhelm-Leen et al\cite{5} as the presence of three out of following five:-

- Unintentional weight loss
- Slow gait
- Weakness
- Low physical activity
- Exhaustion.

MOCA test was done in each study subject. MOCA was designed as a rapid screening instrument. It has different domain such as alternative trial making, visuoconstructional skills (Cube and Clock), naming, memory, attention, sentence repetition, verbal fluency, abstraction, delayed recall, and orientation. It is a 30 point test that takes around 10–15 min to complete and determine several cognitive domains. Cognitive impairment is present when the score is <26 and score ≥26 was considered normal.

All patients of stable COPD of age 40–75 years presenting in chest clinic were enrolled for study and illiterate patients, COPD patients in exacerbation and patients with altered sensorium were excluded.

Study Duration

The study duration was a August 2016–July 2017.

Sample Size

80 patients who satisfied the above-mentioned criteria were enrolled.

Procedure

After obtaining informed consent baseline social, demographic data were collected by a trained medical person.

Statistical Analysis

We performed all statistical analyses using SPSS 23.0 and Epi info 7 for windows. Univariate analysis (Chi-square test)
was performed to find statistical significance \( P < 0.05 \) and unadjusted odds ratio. The statistical analysis will comprise calculating means and proportions. Parametric test (t-test analysis variance) was used to calculate group reference for continuous variables. Level of significance would be considered as \( P < 0.05 \).

**RESULT**

In this study, 80 patients of COPD were enrolled. Out of them 61 were males and rest were females. Among them, 63 (78%) patients had diagnosis of frailty. The mean age among frail group was 62.29 ± 10.06 and among non-frail patients age was 51.82 ± 10.98 years.

65 (81.25%) patients were married, and 82.5% were financially dependent on other family members and near about the same number, e.g., 83.7% patients were living in joint family. Only 2.5% patients were living alone and rest were living in a nuclear family.

Most of the patients 67 (83.75%) had a history of smoking in their life. The other observed demographic characteristics are given in tabular form in Table 1.

When we assessed the comorbid conditions associated with the diagnosis of COPD, only 4 (5%) has none while rest of 95% patients has one or other comorbid condition. The most common among them is hypertension in 30% cases, and least common was heart failure 6.25%. Other identified comorbid conditions in reducing the order of frequency are gastroesophageal reflux disease, diabetes mellitus, arthritis, coronary artery diseases, pulmonary tuberculosis, chronic kidney diseases, and allergic symptoms. These data are given as tabular form in Table 2.

Among individual parameters of frailty, handgrip strength was measured to be 12.02 ± 8.03 among frail COPD patients compared to 30.71 ± 9.15 in non-frail COPD patients. \( p \) value comes out to be 0.000 which is statistically significant [Table 3].

Likewise walking speed in frail patients was 12.33±12.70 meters per minute and in non-frail patients, speed was 15.76±12.48 m/min. \( p \) value comes out to be 0.324 which is statistically not significant [Table 4].

Out of 63 patients with frailty only 3 (4.7%) has MOCA score ≥26 (i.e., normal) and around 17 patients of COPD without frailty only (5.8%) has MOCA score ≥26. Rest of patients have MOCA score <26, which can be interpreted as the presence of cognitive impairment. \( p \) value of this data comes out to be 1.00 which is statistically not significant. This means that presence of cognitive impairment does not increase the risk of frailty in patients of COPD [Table 5].

**DISCUSSION**

Our study demonstrates that frailty is common (78%) in patients of COPD, although all have stable COPD. Since the diagnosis of acute exacerbation was excluded from the

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**Table 1: Baseline demographic characteristics of patients**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frailty</td>
<td>63 (78)</td>
</tr>
<tr>
<td>Mean age of frail group (years)</td>
<td>62.29±10.06</td>
</tr>
<tr>
<td>Mean age of non-frail group (years)</td>
<td>51.82±10.98</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>61 (76.25)</td>
</tr>
<tr>
<td>Female</td>
<td>19 (23.75)</td>
</tr>
<tr>
<td>Male with frailty</td>
<td>51.61 (83.60)</td>
</tr>
<tr>
<td>Female with frailty</td>
<td>12.19 (83.20)</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>44 (55)</td>
</tr>
<tr>
<td>Muslim</td>
<td>36 (45)</td>
</tr>
<tr>
<td>Others</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>65 (81.25)</td>
</tr>
<tr>
<td>Unmarried</td>
<td>15 (18.75)</td>
</tr>
<tr>
<td>Financial status</td>
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</tr>
<tr>
<td>Dependent</td>
<td>66 (82.5)</td>
</tr>
<tr>
<td>Independent</td>
<td>14 (17.5)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
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<tr>
<td>Illiterate and primary</td>
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</tr>
<tr>
<td>Middle</td>
<td>24 (30)</td>
</tr>
<tr>
<td>Matric</td>
<td>38 (47.5)</td>
</tr>
<tr>
<td>Senior secondary</td>
<td>14 (17.5)</td>
</tr>
<tr>
<td>Graduate</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Family type</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Nuclear</td>
<td>11 (13.75)</td>
</tr>
<tr>
<td>Joint</td>
<td>67 (83.7)</td>
</tr>
<tr>
<td>Smoke exposure</td>
<td></td>
</tr>
<tr>
<td>Bidi/cigarette</td>
<td>67 (83.75)</td>
</tr>
<tr>
<td>Other</td>
<td>13 (16.25)</td>
</tr>
<tr>
<td>Tobacco use</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>18 (22.5)</td>
</tr>
<tr>
<td>Past&gt;1 month</td>
<td>49 (61.2)</td>
</tr>
<tr>
<td>None</td>
<td>13 (16.25)</td>
</tr>
</tbody>
</table>

**Table 2: Comorbidities in patients under study**

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>4 (5)</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>15 (18.75)</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
<td>22 (27.5)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>19 (23.75)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>24 (30)</td>
</tr>
<tr>
<td>Allergic symptoms</td>
<td>8 (10)</td>
</tr>
<tr>
<td>Pulmonary tuberculosis</td>
<td>13 (16.25)</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>12 (15)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>17 (21.25)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>5 (6.25)</td>
</tr>
</tbody>
</table>
study. Similar results were also seen in a study conducted by Limpawattana et al.[9]

The mean age of frail group in our study was 62.29 ± 10.65 years, and among non-frail patients, it was 51.82 ± 10.98 years. This is to mention here that all patients were with a diagnosis of COPD. Similar results of 64 ± 13 years were obtained from the Mittal et al.[9] and mean age was in patients of frailty was 73.5 ± 8.9 years in a study conducted by Limpawattana et al.[9] and Matthew et al.[10]

In our study hypertension (30%) was most common comorbidity followed by gastroesophageal reflux disease (27.5%) and the least common was heart failure (6.25%) [1]. In a study conducted by Mittal et al.[9] the most common comorbidity was hypertension (46%) followed by CAD (26%) and least common was peripheral vascular disease (4%).

Handgrip strength in our COPD patients with frailty was 12.02 ± 8.03 kg while in another study[9] it 22.5 ± 7.9 kg, which is relatively higher than our study. This may be due to the different ethnic population of two studies. Likewise, gait speed in our frail patients was 12.33 ± 12.70 m/min, and in non-frail patients, it was 30.71±9.15 m/min. This parameter was also measures in another study where it was 40.5 ± 11.1 m/min in frail patients and 57.4 ± 13.4 m/min in non-frail patients[9]. These values are significantly higher than our study, which may be attributed to baseline diagnosis of COPD in our patient population and different ethnicity group.

In our study, we also measure cognitive impairment using MOCA score (Hindi version). We found that presence of cognitive impairment in patients of COPD does not affect the occurrence of frailty and both may be independent causes of morbidity in patients of COPD.

A study conducted by Verma et al. in 2017 about assessment of cognitive function status in patients of COPD by MOCA and Hindi Version found that cognitive impairment was present in 85 cases out of 95 cases understudy this was significantly higher than controls where in 46 patients has cognitive impairment out of 78 controls ($P = 0.000$).[11]

### Strength of Study
First time in this area of world frailty was measure in patients of COPD and MOCA score was assessed in patients of COPD with frailty.

### Limitation of Study
A small number of patients limits implications of results to general public use.

## CONCLUSION
Frailty is a common occurrence in chronic obstructive pulmonary disease. Reduced handgrip strength and slowness of gait were the most common satisfying criteria of frailty in our patient. These patients have comorbidities along with COPD; so adequate management of COPD is key to prevent or delay occurrence of frailty.

### REFERENCES
Verma and Singh: COPD and Frailty and its Association with Cognitive Function


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Pelvic Floor Disorders Following Hysterectomy for Benign Conditions of Uterus and Endometrial Carcinoma - A Long-term Follow-up Study

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Abstract

Background: Vaginal vault prolapse occurs usually as a consequence of prior hysterectomy. Other causes are inborn or age dependent insufficiency of soft tissue, damage to the pelvic floor during and after childbirth and obesity (>BMI) and other conditions that increase intra-abdominal pressure.

Aim of the Study: To study measured symptoms of pelvic floor disorders (PFD) and their effect on quality of life in post Hysterectomy women for Benign and Malignant lesions of Endometrium.

Materials and Methods: 134 women with post Hysterectomy history were included. Demographic data, height, weight, BMI, time since surgery, Staging of endometrial carcinoma, type of hysterectomy, menopausal status, hormone replacement status, smoking status, parity, and number of vaginal deliveries were elicited. Severity of the symptoms of (PFD) Pelvic Floor Distress Inventory (PFDI-20) was used. This consisted of 3 subscales: Urinary Distress Inventory (UDI-6), Pelvic Organ Prolapse Distress Inventory (POPDI-6), and Colorectal-Anal Distress Inventory (CRADI-8).

Observations and Results: 134 women were divided into 2 groups. Group A patients who have undergone Hysterectomy for benign conditions of endometrium and group B for malignant conditions of endometrium. Age groups were 30 -60; mean age of 44.72±4.60 years. In group A, PFD symptoms of POPDI-6 were 46/84 (54.76%), CRADI-8 were 57/84 (67.85%) and UDI-6 were 61/84 (72.61%) patients. In group B, PFD symptoms of POPDI-6 were reported by 33/50 (66%), CRADI-8 by 32/50 (64%) and UDI-6 by 30/50 (60%) patients.

Conclusions: Prevalence of Pelvic Floor Disease is higher in our study of Post Hysterectomy women undergoing for both benign and malignant indications. The degree of symptoms most commonly was mild but the patients should be enquired about these symptoms that are possible. There was more than one organ system of pelvic floor that was involved.

Key words: Benign, Hysterectomy, Malignant and endometrium, Pelvic floor, Quality of life

INTRODUCTION

Hysterectomy is one of the most common surgeries performed worldwide for various benign and malignant conditions of the uterus apart from its endometrial diseases. Posthysterectomy patients are likely to develop pelvic floor disorders (PFDs) during their post-operative period. The common symptoms of these PFDs are urinary incontinence, pelvic organ prolapse, and fecal incontinence. There are many reports in the literature giving the prevalence of PFD in general population to be 23.7%; 15.7% of women experiencing urinary incontinence, 2.9% pelvic organ prolapse, and 9.0% experiencing fecal incontinence. A woman reporting at least one complaint of PFD increases proportionately with age, gravidity, increased parity, and body mass index (BMI). This leads to increased surgeries to correct pelvic floor and in the USA more than 338,000 such procedures undertaken annually.

In an Indian study based at Ahmadabad, it was found that 9.8% of rural women and 5.3% of urban insured...
women had had a hysterectomy, compared to 7.2% and 4.0%, respectively, of uninsured women; one-third of the hysterectomy patients were below 35 years of age. It was reported that among the risk factors, prolapse of uterus was the main factor resulting in PFD. Among the malignant conditions, carcinoma of the endometrium is the most common indication for hysterectomy. As more than 75% of the cases of endometrial carcinoma are diagnosed in Stage-I, for which the indicated surgery is hysterectomy. Several immediate and long-term complications are described in literature following hysterectomy such as mild-to-severe morbidity, ureteral injuries, bowel injuries, bladder injuries, and hemorrhage. There are not many studies about the prevalence of PFD in posthysterectomy patients published in the literature. The present study was conducted in this context to identify the prevalence of symptoms of PFD in posthysterectomy patients the indications being both benign and malignant diseases of the endometrium; in addition to assess the impact of PFD on patient quality of life.

MATERIALS AND METHODS

This study was cross-sectional study of 134 women who had undergone hysterectomy and presenting with symptoms of PFD. An ethical committee clearance was obtained; consent form approved by the committee was used. The 134 patients included were divided into two groups. Group A consisted of 84 women who underwent hysterectomy for benign conditions of endometrium. Group B consisted of 50 women who underwent hysterectomy for malignant conditions of the endometrium.

Inclusion Criteria
1. Patients aged between 30 and 60 years were included.
2. Patients who have undergone hysterectomy more than 1 year ago were included.
3. Patients who have undergone hysterectomy for both benign and malignant conditions of the endometrium are included.
4. Posthysterectomy patients with at least one symptom of PFD were included.

Exclusion Criteria
1. Patients aged below 30 and above 60 years were excluded.
2. Patients who are nulliparous were excluded.
3. Patients with BMI below 25 were excluded.
4. Patients who have undergone radiotherapy following hysterectomy were excluded.
5. Patients who have undergone surgeries for PFD were excluded.

Demographic data were collected in a printed pro forma approved by the ethical committee which included age, height and weight, time since surgery, staging of endometrial carcinoma, type of hysterectomy, menopausal status, hormone replacement status, parity, and number of vaginal deliveries. To assess the severity of the symptoms of PFD inventory (PFDI-20) was used. This consisted of three subscales: Urinary distress inventory (UDI-6), pelvic organ prolapse distress inventory (POPDI-6), and colorectal-anal distress inventory (CRADI-8). Each inventory consisted of 6, 6, and 8 questions, respectively. They were answered with a 4-point Likert scale: 1- not at all to 4- quite a bit. Only the mean values of all answered items are multiplied by 25 to determine the scale score (range 0–100). Higher scores denote a greater symptom or impact score. All the data were analyzed with standard statistical methods.

OBSERVATIONS AND RESULTS

A total of 134 women were divided into two groups. Group A patients who have undergone hysterectomy for benign conditions of endometrium and Group B for malignant conditions of endometrium. The demographic data of the Group A women included showed that they belonged to ages between 30 and 60 years with a mean age of 44.72 ± 4.60 years. The mean values of weight and height are shown in Table 1. 26 women had attained menopause (30.95%) and 62 had not (73.80%). 55 patients had undergone abdominal hysterectomy and 29 (65.47%) had undergone vaginal hysterectomy (34.52%). Of a total follow-up of 5 years of in the present study, the time lapse between the hysterectomy and appearance of PFD symptoms was observed in 47/84 patients (55.95%) within 3 years and 37/84 patients (44.04%) complained of symptoms after 3 years. The relation of posthysterectomy patients and their parity is shown in Table 1. 23 (27.83%) patients required hormonal replacement as they had undergone total hysterosalpingo-oophorectomy [Table 1].

The demographic data of the Group B women (50 patients) included showed that they also belonged to ages between 30 and 60 years with a mean age of 54.24 ± 3.10 years. The mean values of weight and height are shown in Table 2. 8 women had attained menopause (16%) and 62 had not (84%). All the patients had undergone abdominal hysterectomy. Of a total follow-up of 5 years of in the present study, the time lapse between the hysterectomy and appearance of PFD symptoms was observed in 28/50 patients (56%) within 3 years and 22/50 patients (44%) complained of symptoms after 3 years. The relation of posthysterectomy patients and their parity is shown in Table 2. All the (100%) patients required hormonal replacement as they had undergone total hysterosalpingo-oophorectomy [Table 2].
In Group A pelvic symptoms of POPDI-6 were reported by 46/84 (%), CRADI-8 by 57/84 (%), and UDI-6 by 61/84 (%) patients. These findings demonstrate that Group A patients had more than one PFD symptoms [Table 3].

In Group B pelvic symptoms of POPDI-6 were reported by 33/50 (%), CRADI-8 by 32/50 (%), and UDI-6 by 30/50 (%) patients. These findings demonstrate that Group A patients had more than one PFD symptoms [Table 4].

**DISCUSSION**

Vaginal vault prolapse occurs usually as a consequence of prior hysterectomy. Other causes are inborn or age dependent insufficiency of soft tissue, damage to the pelvic floor during and after childbirth and obesity (>BMI) and other conditions that increase intra-abdominal pressure.[13,14] Post Hysterectomy women are prone to Pelvic Floor Diseases could be due to excision of the parametrium which is typically the elasto-fibromuscular support tissue for the vaginal cuff. In Urogynaecologic researches the PFDI-20 can be used to measure the extent of lower urinary tract, colorectal-anal, and pelvic organ prolapse symptoms and how they affect the quality of life of these women. They are found to be validated, reliable, and responsive to change.[15] These patient-oriented subjective evaluation methods are recommended for improving the quality of clinical research projects and play an important role in fixing the goals for Healthcare Research and Quality.[12] In the present study of follow up of 5 years post Hysterectomy women the prevalence of PFD among benign conditions of the endometrium were ranging from 51.85% to 56.61%. In Post Hysterectomy for endometrial carcinoma the prevalence was ranging from 60 to 66%. This is higher than the prevalence reported in the literature among the general population as 23.7%.[1] This can be explained by the fact that in group B women the procedure involved the wide dissection of uterus, fallopian tubes and ovaries with lymphadenectomy than seen hysterectomy for benign conditions. In the present study this difference was similar in regards with parity, BMI and age of the women. Review of literature has shown that hysterectomy increases the risk of PFDs. The cumulative risk of developing PFDs rises from 1% at 3 years to 5% at 15 years. In the present study women with symptoms, most were in the mild range in group A (Table 3) and severe in Group B (Table 4).
has been correlated with quality of life measures, the association is typically observed in women with more severe symptoms. In this study there was no correlation between prevalence of PFDs and a higher endometrial cancer stage (Table 1). The present study though an attempt to identify the risk factors and prevalence of pelvic floor diseases in post Hysterectomy women compared to the prevalence in general population obtained from the literature has some limitations. Firstly the sample size is small. The pre-operative data was lacking which was because of the practice patterns at our tertiary referral institution. Patients with stage-I endometrial carcinoma were sent back to their family physicians for follow up hence a larger could not be undertaken. A larger population could undergo multivariate analysis to determine major risk factors for PFDs in postoperative women who have undergone hysterectomy for endometrial cancer. Similarly advanced stages of carcinoma patients were more likely to end up with follow up at the radiotherapist or oncologist.

### CONCLUSIONS

Prevalence of PFD is higher in our study of post hysterectomy women undergoing for both benign and
malignant indications. The degree of symptoms most commonly was mild but the patients should be enquired about these symptoms that are possible. There was more than one organ system of pelvic floor that was involved. Early screening of this high-risk population in the postoperative period may increase identification and improve patient quality of life.

REFERENCES


How to cite this article: Padmaja P. Pelvic Floor Disorders Following Hysterectomy for Benign Conditions of Uterus and Endometrial Carcinoma - A Long-Term Follow-Up Study. Int J Sci Stud 2017;5(8):81-85.

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Pre-operative Computed Tomography Findings and Pre-operative Findings in Sinonasal Diseases - A Comparative Study

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Abstract

Background: Computed tomography (CT) scan is a useful diagnostic tool in the evaluation of diseases of the paranasal sinuses (PNS) and an integral part of surgical planning. Mastering of anatomy of PNS and its variations helps in understanding the pathological changes and radiological signs of sinonasal diseases to guide an ear, nose, and throat in planning the surgery.

Aim of the Study: To compare the CT scans findings and intraoperative findings following functional endoscopic sinus surgeries (FESS) for sinonasal diseases.

Material and Methods: A total of 58 patients with sinonasal diseases were included in the study. Pre-operative CT scans were taken in all the patients, and their intra-operative FESS findings were noted. Both the findings were compared and correlated for any discrepancy in reading the radiological signs. The specificity and sensitivity of the CT scan findings were analyzed.

Observations and Results: A total of 58 patients were aged between 14 years and 63 years with a mean age of 39.50 ± 3.70. 32 patients belonged to the age groups of 24–43 (55.17%). The most common symptom in the study observed was nasal obstruction in 43 (74.13%) followed by nasal discharge in 38 (65.51%). The positive predictive value was the highest for mucosal thickening was 100% followed by a pathological variation in ethmoid sinus (92%).

Conclusions: Specificity of the CT scan findings pertaining to mucosal thickening, fungus, polyp and pathologic variations in ethmoid sinus was good (>80%). CT with its excellent capability for displaying bone and soft tissues is the current diagnostic modality of choice for evaluating the osteomeatal complex. Sensitivity was good for pathological variations in maxillary antrum and ethmoid sinuses (>90%).

Key words: Computed tomography scan, Sinonasal diseases, Functional endoscopic sinus surgery, Mucociliary, Osteomeatal complex

INTRODUCTION

Computed tomography (CT) scans have dramatically improved the imaging of paranasal sinuses (PNS) anatomy as compared to plain X-rays. Subtle variations and critical areas anatomy are well appreciated.[1] CT provides essential pre-operative information for the assessment of patients undergoing functional endoscopic sinus surgery (FESS).

CT scan helps in delineating the extent of the disease, anatomical variations, relationship of the sinuses with the surrounding important structures such as orbit, anterior, and middle cranial fossae; CT scan also helps in identifying the extension to surrounding structures which produce complications.[2] Endoscopy and CT have revolutionized the understanding and management of chronic sinusitis in recent times.[3] In 1967 Messerklinger[4] studied mucociliary clearance of the sinuses utilizing endoscopy in patients and time-lapsed photography in fresh autopsy specimens. In 1978 Messerklinger[5] presented systematic and detailed work documenting his endoscopic findings. In 1985 Kennedy et al.[6] stated that FESS is a term collectively used for surgeries devised by Messerklinger to correct the underlying sinus infections. In 1987 Zinreich et al.[7] stated that CT and endoscopy are complementary in the diagnosis and treatment
of nasal and paranasal sinus diseases. In 1988 Stammberger\cite{8} believed that most sinus infections are rhinogenic in origin. The infection usually starts in middle meatus with mucosal contact, cessation of ciliary action, stasis and infection. In 1992 Kaluskar and Patil\cite{9} correlated the CT and operative findings and reported that the maxillary sinuses correlated well, and for the ethmoids, the mucosal disease was found to be far more spread than detected on CT scan. In this context, a clinical study was conducted to correlate the CT scans findings and intra-operative findings in patients undergoing FESS for Sinonasal diseases.

**Study Period**  
The study period was from August 2015 to July 2017

**Institute of Study**  
This study was conducted at Teaching Hospital of Kannur Medical College, Anjarakandy, Kannur, Kerala.

**MATERIALS AND METHODS**

A total of 58 patients attending the ear, nose, and throat (ENT) out-patient department of a tertiary teaching hospital were included in the present prospective study. The patients with complaints of sinonasal diseases were included. An Ethical Committee clearance certificate was obtained before the commencement of the study. An Ethical Committee cleared consent form was used in the study.

**Inclusion Criteria**

1. Patients aged above 14 years and below 63 years were included.
2. Patients with sinonasal diseases of the PNS were included.

**Exclusion Criteria**

1. Patients with acute exacerbation of chronic sinusitis were excluded.
2. Patients with sinus malignancies were excluded.
3. Patients who are not willing to undergo surgery were excluded.
4. Pediatric age group (age <14 years) was excluded.
5. Patients who are pregnant and lactating were excluded.
6. Patients with chronic debilitating diseases were also excluded.

All the patients were subjected to thorough history taking, ENT examination and CT scans were taken after preparing the patient with antihistamines and nasal sprays of steroids for 1 month to eliminate acute pathology.

**Methods of Collection of Data**

1. All the patients involved were explained in detail about the involvement in this study, and voluntary consent was obtained.
2. After obtaining a detailed history and through clinical examination of nose and PNS, ears and throat and all other systems were done.
3. They were subjected to hematological examination such as hemoglobin, bleeding time and clotting time total count, differential count, and urine examination (albumin, sugar, and microscopy); swab from middle meatus for culture sensitivity along with X-ray PNS was done for the patients.
4. Patients in the active stage of the disease were treated with a course of appropriate antibiotic, systemic antihistamines, and local decongestants.
5. Each patient underwent a systematic diagnostic nasal endoscopy and CT of the nose and PNS.

All the patients were asked to complete a pre-operative questionnaire inquiring subjective chronic rhinosinusitis (CRS) symptoms including nasal obstruction, rhinorrhea, post-nasal discharge, headache, facial pain/pressure and/or olfactory disturbances, and CRS-related symptoms such as cough and asthma. The diagnosis of CRS was made using the American Academy of Otolaryngology,\cite{10} head and neck surgery definition, which describes typical symptoms persisting for 12 weeks or more. All the data were analyzed using standard statistical methods.

**OBSERVATIONS AND RESULTS**

Among the 58 patients selected in the present study the age groups involved were 14 years to 63 years with a mean age of 39.50 ± 3.70. 32 patients belonged to the age groups of 24–43 (55.17%). The extremes of ages were affected by 9 (15.51%) and 6 (10.34%), respectively [Table 1].

Among the 58 patients, 44 (75.86%) were males and the remaining 14 (24.13%) were female patients with a male to female ratio of 3.4:1 [Table 2].

The most common symptom in the study observed was nasal obstruction in 43 (74.13%) followed by nasal discharge in 38 (65.51%), headache in 23 (39.65%), and post-nasal drip in and sneezings in 8 (13.79%), [Table 3].

In the present study, CT scans finding in relation to pathology in the maxillary sinus, osteomeatal complex, mucosal thickening, presence of fungal infections, pus, polyp and pathological variations in ethmoids sinuses were observed and found that the sensitivities were 81.25%, 100%, 93%, 66.6%, 60% 100%, and 92.7%, respectively. Whereas, the specificity values were 42.5%, 50%, 100%, 85%, 865, 90%, and 83%, respectively. The osteomeatal complex patency and presence of polyp were 100% specific and sensitive in the study [Table 4].
In the present study, CT scans finding in relation to pathology in the maxillary sinus, osteomeatal complex, mucosal thickening, presence of fungal infections, pus, polyp, and pathological variations in ethmoids sinuses were observed for their accuracy intraoperatively and found that true positive values were found and shown in Table 5.

In the study, the positive predictive value was the highest for mucosal thickening (100%) followed by a pathological variation in ethmoid sinus (92%). Then, it was polyp (90.9%) followed by a pathological variation in maxillary sinus. Least positive predictive value was for pus. Negative predictive value was the highest for pathological variation in maxillary sinus and osteomeatal complex patency. Least negative predictive value was for mucosal thickening [Table 6].

Statistical test applied was Fisher Exact test with an objective to find the \( P \) value (the probability of error value) is significant (i.e., \(<0.05\))

1. For pathologic variations of maxillary sinus

<table>
<thead>
<tr>
<th>Positive Operative findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Two-sided \( P = 0.0307 \) considered significant. Row-column association is statistically significant.

2. For osteomeatal complex block

<table>
<thead>
<tr>
<th>Positive Operative findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Two-sided \( P = 0.0175 \), considered significant. Row-column association is statistically significant.

3. For mucosal thickening

<table>
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<th>Positive Operative findings</th>
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<td>CT</td>
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</tr>
<tr>
<td>14</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

Two-sided \( P = 0.0004 \), considered extremely significant. Row-column association is statistically significant.

4. For pus

<table>
<thead>
<tr>
<th>Positive Operative findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

Two-sided \( P = 0.0726 \), considered not quite significant. Row-column association is not statistically significant.

5. For fungus

<table>
<thead>
<tr>
<th>Positive Operative findings</th>
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</thead>
<tbody>
<tr>
<td>CT</td>
</tr>
<tr>
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<tr>
<td>4</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>2</td>
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</tbody>
</table>

In the study, the positive predictive value was the highest for mucosal thickening (100%) followed by a pathological variation in ethmoid sinus (92%). Then, it was polyp (90.9%) followed by a pathological variation in maxillary sinus. Least positive predictive value was for pus. Negative predictive value was the highest for pathological variation in maxillary sinus and osteomeatal complex patency. Least negative predictive value was for mucosal thickening [Table 6].
Two-sided $P = 0.0374$, considered significant. Row-column association is statistically significant.

6. For polyp

<table>
<thead>
<tr>
<th>Parameters</th>
<th>True positive</th>
<th>False positive</th>
<th>True negative</th>
<th>False negative</th>
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</thead>
<tbody>
<tr>
<td>Maxillary antrum status</td>
<td>41</td>
<td>08</td>
<td>09</td>
<td>00</td>
</tr>
<tr>
<td>Osteomeatal complex patency</td>
<td>43</td>
<td>09</td>
<td>06</td>
<td>00</td>
</tr>
<tr>
<td>Mucosal thickening</td>
<td>44</td>
<td>00</td>
<td>09</td>
<td>05</td>
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<tr>
<td>Pus</td>
<td>09</td>
<td>03</td>
<td>37</td>
<td>03</td>
</tr>
<tr>
<td>Fungus</td>
<td>08</td>
<td>02</td>
<td>39</td>
<td>09</td>
</tr>
<tr>
<td>Polyp</td>
<td>32</td>
<td>06</td>
<td>20</td>
<td>00</td>
</tr>
<tr>
<td>Ethmoid sinus status</td>
<td>36</td>
<td>04</td>
<td>10</td>
<td>08</td>
</tr>
<tr>
<td>Total</td>
<td>213</td>
<td>35</td>
<td>130</td>
<td>25</td>
</tr>
</tbody>
</table>

Two-sided $P = 0.0001$, considered extremely significant. Row-column association is statistically significant.

7. For pathologic variations in ethmoid sinus

<table>
<thead>
<tr>
<th>Parameters</th>
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<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathological variations in maxillary sinus</td>
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<td>100</td>
</tr>
<tr>
<td>Osteomeatal complex patency</td>
<td>82</td>
<td>100</td>
</tr>
<tr>
<td>Mucosal thickening</td>
<td>100</td>
<td>83</td>
</tr>
<tr>
<td>Pus</td>
<td>60</td>
<td>86.66</td>
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<tr>
<td>Fungus</td>
<td>66.6</td>
<td>85.71</td>
</tr>
<tr>
<td>Polyp</td>
<td>90.9</td>
<td>100</td>
</tr>
<tr>
<td>Pathological variations in ethmoid sinus</td>
<td>92</td>
<td>83.33</td>
</tr>
</tbody>
</table>

CT: Computed tomography

Two-sided $P = 0.0022$, considered very significant. Row-column association is statistically significant.

The consolidated $P$ values for different observations were tabulated in Table 7.

$P < 0.05$ in six of the seven parameters compared in the computed tomographic findings with operative findings in the sinonasal diseases. Inference: The row-column association, i.e., the association between the findings in CT and operative findings in sinonasal diseases correlated well in the parameters included in the study in our group.

**DISCUSSION**

The present study entitled “pre-operative computed tomographic findings and per-operative findings in sinonasal diseases-comparative study” was conducted in the tertiary teaching Hospital of Kannur Medical College, Anjarakandy, Kannur, Kerala between August 2015 and July 2017. Out of the 20 patients, all underwent middle antrostomy and an anterior ethmoidectomy. While posterior ethmoidectomy was done in 19 cases and sphenoidotomy was done in 13 patients. All the cases have undergone diagnostic nasal endoscopy and CT before the operation. Age distribution: As shown in Table 1, in our study age of patients varied between 14 and 63. More than 50% of the patients were between 24 and 43 years age groups. In a similar study conducted by Kumari et al., the ages ranged from 16 to 52, with the majority of patient's cases (46.7%) in the third decade. Sex distribution: In this study among the 58 patients 44 (75.86%) were males and the remaining 14 (24.13%) were female patients with a male to female ratio of 3.4:1. In a similar study by Kumari et al., there were 19 males (59.37) and 13 females (40.62%) with a ratio of 1.46:1. Symptoms: As shown in Table 3, in the present study, the most common symptom in the study observed was nasal obstruction in 43 (74.13%) followed by nasal discharge in 38 (65.51%), headache in 23 (39.65%), and post-nasal drip in and sneezings in 8 (13.79%). In the majority of patients, duration of the symptom was present more than 6 months. In the study conducted by Gandotra et al., the most common complaint was nasal discharge occurring in 25 patients (78.1%), followed by headache in 22 patients (68.7%) and nasal obstruction in 22 patients (68.7%). The other complaint was sneezing in 6 patients (18.7%), Anosmia and cacosmia in 2 patients each (6.25%). The duration of symptom varied from 3 months to 30 years. In the study conducted by Gandotra et al.
the nasal discharge and headache were the most common symptoms, and the next common symptoms were post-nasal drip and nasal obstruction. The result of the present study is comparable with regard to nasal obstruction, headache, and post-nasal drip and sneezing. Nasal discharge was 65.51% in our study which is less when compared to the studies mentioned above. Signs: In the present study, clinical signs taken were the presence of polyp on DNE and sinus tenderness. Sinus tenderness was present in 47 patients (81.03%) among the 58 patients included in the study. Polyp was identified clinically identified in 34 patients out of 58 (58.62%). In the study conducted by Venkatachalam and Bhat a clinical sign such as hypertrophied inferior turbinate (10%), hypertrophied middle turbinate (17.14%), congested mucous membrane (15.71%), sinus tenderness (58%), and ethmoidal polyp (12.8%) were reported. Diagnosis: Among the 58 patients, chronic sinusitis was observed in 23 patients (39.65%) and sinonasal polyposis in 35 (60.34%) patients. In the study conducted by Gandotra et al. 60.8% had chronic sinusitis 40% had sinonasal polyposis was reported. While in a study conducted by Jones et al. 75% had chronic sinusitis and 25% had diffuse polyposis. The present study was comparable with the study conducted by Gandotra et al. Pre-operative CT scan findings and per-operative findings in sinonasal diseases: Elahi and Elahi were of the opinion that a standardized pro forma for reporting CT images has to be followed, with pre-operative imaging and endoscopic intervention relationship can be consolidated and further enhanced. In the present study, computed tomographic scan of the patient was taken, and several parameters were compared with operative findings, namely, pathological variations of maxillary antrum, osteomeatal patency, mucosal thickening, pus, fungus, and pathological variations of ethmoid sinus. Specificity of the computed tomographic scan findings pertaining to mucosal thickening, fungus, polyp and ethmoid sinus status was good. Sensitivity for pathological variation was good for osteomeatal complex patency, pathological variation of maxillary antrum and ethmoid sinus in our study osteomeatal unit was involved in 74.13% of the cases. According to Lund and Mackay, the osteomeatal complex acts as a drainage pathway for maxillary, anterior ethmoids and frontal sinuses. Posterior osteomeatal unit is considered as a part of the sphenoid sinus. In several areas of osteomeatal complex two mucosal areas come into contact causing local impairment of mucociliary clearance leading to stagnation of secretion, creating the potential for infection even without osteal closure. Anatomically, the area of contact is mostly in narrow mucosa lined channels of middle meatus and infundibulum. In a study conducted by Zinreich et al. osteomeatal unit was involved in 72% of patients with chronic sinusitis. CT with its excellent capability for displaying bone and soft tissue is the current diagnostic modality of choice for evaluating the osteomeatal complex (Zinreich et al., 1987). Sensitivity of fungus in the modality of CT scan in our study was 66.6%, which is good. The demonstration of focal or diffuse areas of increased attenuation in paranasal sinus soft tissue masses on unenhanced CT scans strongly suggests fungal involvement; in the study conducted by Zinreich et al. the sensitivity was found to be 80% for fungus. Sensitivity was good for pathological variations in maxillary antrum and ethmoid sinus (>90%). Similar observation was made by Kaluskar and Patil when they compared the sinus diseases radiologically and peroperatively. CT finding of sinus opacification and mucosal thickening are all findings of acute sinusitis. Many non-specific CT findings, including thickened turbinate (nasal cycle vs. allergic process vs. inflammation) or diffusely thickened sinus mucosa (allergic disease vs. chronic sinusitis), may be associated with several sinonasal conditions. CT of the PNS has improved the visualization of paranasal sinus anatomy and has allowed greater accuracy in evaluating paranasal sinus disease.

Table 7: The P values for different observations in the study (n=58)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathologic variations in maxillary antrum</td>
<td>0.0307</td>
</tr>
<tr>
<td>Osteomeatal complex</td>
<td>0.0175</td>
</tr>
<tr>
<td>Mucosal thickening</td>
<td>0.0004</td>
</tr>
<tr>
<td>Pus</td>
<td>0.0726</td>
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<tr>
<td>Fungus</td>
<td>0.0374</td>
</tr>
<tr>
<td>Polyp</td>
<td>0.0001</td>
</tr>
<tr>
<td>Pathologic variations in Ethmoid sinus</td>
<td>0.0022</td>
</tr>
</tbody>
</table>

Drawbacks in this Study

CT scan may show overemphasis of the diseases if CT scan had been taken in the acute state. Secretions can show homogenous opacity without any mucosal changes in the CT scan; CT scan changes poorly correlate with patient symptoms.

Recommendation

Ideally pre-operative CT scan should be immediately followed by endoscopic sinus surgery to actually predict the sensitivity and specificity of CT scan modality. Sagittal cuts of CT should also be included in the study. CT guided sinus surgeries should be included in the study. Sampling should be done to ascertain the sensitivity and specificity of the CT with high confidence.

CONCLUSION

Specificity of the CT scan findings pertaining to mucosal thickening, fungus, polyp and pathologic variations in ethmoid sinus was good (>80%). CT with its excellent.
capability for displaying bone and soft tissue is the current diagnostic modality of choice for evaluating the osteomeatal complex. Sensitivity was good for pathological variations in maxillary antrum and ethmoid sinuses (>90%).

REFERENCES


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Occurrence of Depression in Patients of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome: An Observational Study

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Abstract

Introduction: Depression is a state of low mood and aversion to activity that can affect a person’s thoughts, behavior, feelings, and sense of well-being. In recent studies, lifetime prevalence of depressive disorders in human immunodeficiency virus (HIV) individuals was found to be 22% and that in the general population was 3%–10%. The aim of our study is to find the occurrence of depression in HIV/acquired immunodeficiency syndrome (AIDS) individuals and study the clinical profile of depression in patients of HIV/AIDS, and effect of treatment of depression in patients of HIV/AIDS.

Material and Methods: It was an observational study including 269 HIV positive patients who were willing to be a part of the study. Patients having any long-term illness apart from HIV/AIDS leading to depression were excluded from the study. Depression was measured using following scales: General health questionnaire-28 (for screening of HIV/AIDS patients for psychiatric illness), DSM IV scaling (for diagnosis of depression), Hamilton scale (for severity analysis of depression), and mini-mental state examination scale (for assessment of cognitive function).

Results: Out of 269 HIV cases, 63 were found to have depression (23.42 %). Out of the 63 having depression, 47 (74.6%) were having mild depression, 15(23.8%) were having moderate depression, and 1 (1.6%) were having severe depression. Depression was found to be more common in 30–39 years of age group (26.2%), with male predominance (26.5%) as compared to the females (20.3%). Depression was more common among patients with CD4 count ≤300 (24.7%) compared with ≥300 CD4 count group (22.0%). On follow-up, 28 out of the 40 depressed HIV patients (who received antidepressants) showed recovery (70%).

Conclusion: Depression was found to be common among the HIV/AIDS patients. Depression was more common among males, among 30–39 year age group and among patients with the lower CD4 count. Early and compliant antidepressant therapy is very effective in treating depression among the HIV/AIDS patients.

Key words: Acquired immunodeficiency syndrome, Depression, Human immunodeficiency virus

INTRODUCTION

The human immunodeficiency virus (HIV) is a lentivirus (a subgroup of retrovirus) that causes HIV infection and acquired immunodeficiency syndrome (AIDS).¹² AIDS is a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections and cancers to thrive. Without treatment, average survival time after infection with HIV is estimated to be 9–11 years, depending on the HIV subtype.

Clinical depression is the most commonly observed mental health disorder among HIV-infected patients, affecting up to 22% of patients.²³ The prevalence may be even greater among substance users. Depressive symptoms have been associated with risk behavior, non-adherence to medications, and shortened survival.⁴⁷ HIV-infected patients do not become depressed simply...
because their disease progresses,[8] however, the presence of hopelessness, anhedonia (the absence of pleasure from usually pleasurable activities), ruminative guilt, and suicidal ideation may indicate accompanying clinical depression requiring psychiatric intervention. Many health-care professionals believe that an HIV+ diagnosis will naturally result in depression. Although the diagnosis will certainly trigger anxiety and distress — sometimes so severe it impairs functioning and may even lead to suicide — this kind of situation-specific emotional response is not the same as depression. A person distressed by an HIV diagnosis may indeed need treatment, most likely for an adjustment reaction, but the distress will respond to supportive and other types of psychotherapy rather than medications.[9,10]

HIV is thought to invade the subcortical areas and can destroy the basal ganglia, thalamus, and temporolimbic structures. While these changes have been directly linked to HIV-associated cognitive/motor complex disorders (HIV-associated dementia complex and minor cognitive motor disorder), it is also thought that damage in these areas can result in new-onset depression as well as mania or psychosis.[11]

This study was done to study the clinical profile of the depressed HIV/AIDS patients. The data will be useful in assisting in planning and implementing the treatment of depression in HIV/AIDS patients and the measure taken to improve the outcome of the illness.

MATERIAL AND METHODS

- Study center: Department of medicine (medicine wards, out-patient department, emergency unit), antiretroviral (ART) center, (Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur [Madhya Pradesh]).
- Duration of study: 18 months.
- Study design: Hospital based observational study.
- Sample size: 269 diagnosed patients of HIV/AIDS.

Inclusion Criteria
- Patients with HIV/AIDS positive and registered under ART center, Jabalpur, and who are willing to be a part of the study.

Exclusion Criteria
- HIV/AIDS individuals not willing to undergo above study.
- Individuals with any long-term illness apart from HIV/AIDS, leading to depression.

All the subjects were informed about the study protocol and written informed consent was obtained. The study was approved by the Ethics Committee of Madhya Pradesh Medical Science University.

Various Psychiatric Rating Scales Applied in Our Study
- General health questionnaire-28: For screening of the psychiatric illness.
- DSM IV scaling: For diagnosis of depression.
- Hamilton scale: For severity analysis of depression.
- Mini-mental state examination scale: For assessment of cognitive function.

RESULTS

- The mean age of HIV/AIDS patients with depression (63) was 34.41 ± 9.11 years, and that of nondepressed HIV/AIDS group (206) was 36 ± 9.85 years, overall mean age of total HIV/AIDS patients (269) was found to be 35.76 ± 9.69 years.
- Depression was more common among the male HIV/AIDS patients, i.e., 26.5% (36 out of 136) as compared to the female HIV/AIDS patients, i.e., 20.3% (27 out of 133).
- Depression was more common in graduate HIV/AIDS patients (24%) followed by 12th STD level of education group (23.8%). Depression is least common among the postgraduate HIV/AIDS patients (21.4%).
- The most common route for HIV/AIDS transmission was heterosexual route (92.19%, 248 out of 269 patients). Among the 63 depressed HIV/AIDS patients, majority were having heterosexual route of transmission (93.7%) followed by I.V. drug abusers (4.8%).
- The mean CD4 count was less in depressed HIV/AIDS patients (312 ± 121.33) as compared to the nondepressed HIV/AIDS patients (399.74 ± 194.48).
- Occurrence of depression in HIV/AIDS patients was 23.42% (63 out of 269) HIV/AIDS patients.

Nondepressed HIV/AIDS patients (Grade I) were 206 out of 269 (76.6%). Depression was present in 63 out of 269 (23.4%), with mild depression (Grade II) having 47/269 (17.5%), moderate depression having 15/269 (5.6%), and severe depression having 1/269 (0.4%).
- Out of the 63 depressed HIV/AIDS patients, 40 (63.49%) patients were compliant for treatment of depression, and 23 (36.50%) refused to take treatment for depression.
- Our observations showed a significant difference between the patients receiving antidepressant therapy as compared with the patients not receiving antidepressants therapy.
DISCUSSION

The mean age of HIV/AIDS patients with depression (63) was 34.41 ± 9.11 years, and that of nondepressed HIV/AIDS group (206) was 36 ± 9.85 years, with \( r = 1.26 \), \( P > 0.05 \) (non-significant). Overall, the mean age of total HIV/AIDS patients (269) was found to be 35.76 ± 9.69 years. Mean age in Bhatia and Munjal study was 30.59 years for depressed HIV/AIDS patients and 30.03 years for nondepressed HIV/AIDS patients.

It was observed that depression was more common among the male HIV/AIDS patients, i.e., 26.5% (36 out of 136) as compared to the female HIV/AIDS patients, i.e., 20.3% (27 out of 133) with \( P > 0.05 \) (non-significant). Talukdar et al. took 84 HIV/AIDS positive women and 82 HIV/AIDS positive men patients in their study observed that depression was more common in male HIV/AIDS patients, i.e., 69 (57.98%).

In our study, it was observed in our study that the most common route for HIV/AIDS transmission was heterosexual route (92.19%, 248 out of 269 patients). Among the 63 depressed HIV/AIDS patients, majority were having heterosexual route of transmission (93.7%) followed by I.V. drug abusers (4.8%). Bhatia and Munjal concluded that depression was more common in heterosexual HIV/AIDS patients as compared to the other routes of infections Khan also observed in their study that the most common route for HIV/AIDS transmission was heterosexual route (93.6%).

It was observed that depression was more common in low socioeconomic HIV/AIDS patients with \( P > 0.05 \) (not significant). Bhatia and Munjal also observed that prevalence of depression was high in low socioeconomic group.

It was observed that 168 HIV/AIDS patients had CD4 count >300 as compare to 93 with CD4 count ≤300. Eshetu et al. observed that HIV/AIDS patients with CD4 count <250 were 99 (23.8%) and CD4 count ≥250 were 317 (76.2%), consistent with our study.

Our study showed that depression was found to be more common in HIV/AIDS patients whose CD4 counts were <300/uL as compare to those with CD4 counts more than 300/uL, with \( P > 0.05 \) (non-significant). Our results were also supported by Rai and Verma study that prevalence of depression was more inpatient having CD4 count ≤300 as compared to the patients having CD4 count >300.

It was observed that the mean CD4 count was less in depressed HIV/AIDS patients (312 ± 121.33) as compared to the nondepressed HIV/AIDS patients (399.74 ± 194.48) with \( P < 0.05 \) (significant). Eshetu et al. found in their study that HIV/AIDS patients had the mean CD4 count 428.53 ± 397.36.

It was observed in our study that occurrence of depression in HIV/AIDS patients was 23.42% (63 out of 269) HIV/AIDS patients. Eshetu et al. observed in their study that prevalence of depression in HIV/AIDS patients was 38.94%. Shittu observed in their study that prevalence of depression in HIV/AIDS patients was 56.7%.

In our study, it was observed that the nondepressed HIV/AIDS patients (Grade I) were 206 out of 269 (76.6%). Depression was present in 63 out of 269 (23.4%), with mild depression (Grade II) having 47/269 (17.5%), moderate depression having 15/269 (5.6%), and severe depression having 1/269 (0.4%) [Table 2]. Shittu et al. in a cross-sectional study, observed that the nondepressed patients were 130 (43.3%). Depression present in 170 (56.7%) HIV/AIDS patients out of total 300 HIV/AIDS patients, with 109 (36.3%) had minimal depression, and 40 (13.3%) had severely depressed.

Out of the 63 depressed HIV/AIDS patients, 40 (63.49%) patients were compliant for treatment of depression, and 23 (36.50%) refused to take treatment for depression [Table 3]. On follow-up, it was found that out of the treatment compliant group, only 12 (30.0%) were having depression and 28 (70.0%) were cured of depression, whereas among the patients not receiving treatment, 18 out of 23 (78.3%) were having depression, and only 5 (21.7%) recovered of depression without antidepressant treatment. Thus, our observations showed a highly significant difference

| Table 1: Occurrence of depression among the HIV/AIDS patients |
|--------------------|-------|
| Depression          | n (%) |
| Present             | 63 (23.42) |
| Absent              | 206 (76.58) |
| Total               | 269 (100) |

HIV: Human immunodeficiency virus, AIDS: Acquired immunodeficiency syndrome

| Table 2: Grading of depression among the HIV/AIDS patients (on the basis of hamilton scale) |
|-----------------------------------------------|-------|
| Grade                                      | n (%) |
| Grade I (no depression)                    | 206 (76.60) |
| Grade II (mild depression)                 | 47 (17.50) |
| Grade III (moderate depression)             | 15 (5.60) |
| Grade IV (severe depression)                | 1 (0.40) |
| Total                                       | 269 (100) |

HIV: Human immunodeficiency virus, AIDS: Acquired immunodeficiency syndrome
between patients receiving antidepressant therapy as compared with patients not receiving antidepressants therapy (with $\chi^2 = 13.64; P < 0.001$).

Hence, patient education about the early diagnosis and constant motivation for compliance to antidepressant therapy is very important in preventing the progression of the disease and for better prognostic outcomes of the HIV/AIDS illness.

**CONCLUSION**

Depression was very common among the HIV/ AIDS patients, and it was found to affect not only the lifestyle of the patient but also has an impact over the progression of the disease.

The present study found that most of the HIV infected patients were from sexually active age group. Heterosexual route was the main route of transmission.

Depression is not only a by-product of the social stigma associated with the illness when the patient comes to know about the illness but also HIV has some serious organic involvement in the brain that leads to the development of serious depressive symptoms among the individuals. The prevalence of depressive symptoms among the HIV/AIDS patients was significant. Thus, the awareness of depression among the HIV patients is very important to alleviate the suffering as well as to minimize the impact of depression on their lives.

Depression was found to be more among the young HIV individuals as compared to the older individuals. Depression was more among the males as compared to the females. Depression was more in lower socioeconomic status and less educated group patients. CD4 count was lower among the depressed HIV/AIDS group as compared to the nondepressed HIV/AIDS patients. Patients with longer duration of illness were more depressed compared to the newly diagnosed HIV individuals.

Depression is a very important factor in the adherence of ART regimen. This study showed that patients adherent to the antidepressant therapy had significantly better outcome as compared to the patients who refused antidepressant therapy. Treatment of depression in HIV patients is thus a very essential part of the management of HIV/AIDS disease progression and in improving adherence to the ART regimen, thus improving the quality of life.

**Applied Importance of the Study**

The information obtained from this study can be used to make recommendations on appropriate models of care for depressed HIV-infected individuals. Although our study is a pilot study, taking our study as a platform, further large population cohort study over longer duration are required to further interpret the impact of the antidepressant therapy on the HIV/AIDS population and its role in management protocol of HIV/AIDS care. Furthermore, results obtained in this study could help in making appropriate and rational policies for early detection of depression in HIV/AIDS and developing effective intervention and prevention of depression in HIV/AIDS.

**REFERENCES**


Use of Bubble Continuous Positive Airway Pressure in A Level II Neonatal Intensive Care Unit: A Descriptive Study

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Abstract

Background: Respiratory distress (RD) is an important cause of admission to the neonatal intensive care unit, which frequently requires respiratory support. Invasive mechanical ventilation is accompanied by many short-term complications and the long-term risk of chronic lung injury. Continuous positive airway pressure (CPAP), being noninvasive, is an effective mean of providing respiratory support and thereby reduces the mortality and morbidity in neonates.

Objective: To assess the efficacy of bubble CPAP (BCPAP) on immediate outcome of preterm and term neonates with mild to moderate RD in a Level II neonatal intensive care unit (NICU) in a tertiary care Government Hospital, Hyderabad, India.

Materials and Methods: Retrospective study was conducted at Level II NICU, Department of Neonatology, Niloufer Hospital from January to June 2016. All admitted neonates of gestational age >28 weeks with mild to moderate RD requiring BCPAP were included in the study.

Results: The total number of babies presenting with RD during the study period was 393. A total of 115 patients were put on BCPAP. The mean gestational age of the study population was 32.37 ± 3.42 weeks. The mean birth weight was 1.65 ± 0.610 kg. 71 were males (61.7%) and 44 were females (38.2%). Inborn babies were 25 (21.7%) and outborn babies were 90 (78.2%). The most common reason for starting CPAP was RD syndrome (76.5%), followed by pneumonia (12.1%). Out of 115 neonates placed on BCPAP, 63 (54.7%) were managed on BCPAP alone and were weaned successfully while 52 babies (45.3%) required mechanical ventilation and were considered in failure group. The success rate was better seen in inborn babies (60%; 15 out of 25) than outborn babies (53%; 48 out of 90).

Conclusion: BCPAP is useful in a tertiary care hospital where human resources are deficit. Availability of more CPAP facilities in peripheral hospitals can further improve the incidence of mortality and morbidity by decreasing the delayed referrals.

Key words: Bubble continuous positive airway pressure, Mortality, Preterm, Respiratory distress, Success, Term infants

INTRODUCTION

Respiratory illness is one of the most common causes of neonatal admissions and deaths in the developing world. An effective way to reduce the incidence of chronic lung injury is the use of continuous positive airway pressure (CPAP) and avoidance of mechanical ventilation.³ Bubble CPAP (BCPAP) prevents alveolar collapse, ensures gas exchange throughout the respiratory cycle and allows lung inflation to be maintained. Preterm infant with mild or moderate hyaline membrane disease or with mild apnea of prematurity can be managed with CPAP.³ However, CPAP has also been used to treat infants with other respiratory disorders including transient tachypnea of the newborn, meconium aspiration syndrome, primary pulmonary hypertension, pulmonary hemorrhage, and patent ductus arteriosus.³ BCPAP is also a less expensive method of respiratory support, most suitable to neonatal units with limited resources in developing countries.⁴ The present study was undertaken to assess the outcome

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of BCPAP in our hospital which is a tertiary care centre and to further assess factors leading to the success or failure of CPAP.

**MATERIALS AND METHODS**

A retrospective study was conducted on neonates of gestational age ≥28 weeks with mild to moderate respiratory distress (RD) admitted to a Level II neonatal intensive care unit (NICU), Department of Neonatology, Niloufer Hospital, Hyderabad. The study was conducted over a period of 6 months, i.e., from January to June 2016. Neonates with a gestational age ≥28 weeks with mild to moderate RD based on Silverman and Anderson score and Downe’s score were included in the study. Exclusion criteria were neonates with RD syndrome (RDS) secondary to birth asphyxia, NEC, congenital anomalies, and neonates requiring intubation at birth and severe cardiovascular instability.

Patients’ detailed history was inclusive of antenatal history, birth history and resuscitation details which were recorded from the case files. In our unit, study babies were put on BCPAP (Fischer and Paykel) as the initial form of respiratory support with short, bi nasal Hudson's cannulae. All babies were nursed under radiant warmers on servo-controlled skin mode. BCPAP was started with 5 cm H\(_2\)O and FiO\(_2\) adjusted to maintain pulse oximeter saturation between 90 and 95%. Babies with a diagnosis of RDS were given surfactant if indicated and if available (Downe’s score 4–6 or requirement of FiO\(_2\) >0.4 CPAP). This was done by insure technique and babies were then put back on CPAP. Monitoring was done clinically, with pulse oximeter, X-rays and ABGs for the requirement of a change in settings, complications, failure and outcome.

Weaning off BCPAP was done when the RD decreased to Downe’s score <3 and ABGs were normal.

Failure of BCPAP was defined as one or more of the following:

- Remained hypoxemic, i.e., SpO2<97% despite FiO\(_2\) 470% and PEEP 47 cm H\(_2\)O.
- Had severe retractions on PEEP 47 cm H\(_2\)O.
- Had prolonged (420 s) or recurrent apneas (42 episodes within 24 h associated with bradycardia) requiring bag and mask ventilation.
- Shock (clinical symptom of inadequate tissue perfusion with clinical signs such as cold extremities, mottling of the skin, tachycardia, and decreased urine output) requiring inotropic support (dopamine >20 mg/kg/min).

Analysis was performed with SPSS (version 20.0). Mean and standard deviation was computed for quantitative variables including birth weight and gestational age. Frequencies and percentages were reported for categorical variables. Student t-test was used to compare continuous variables and Chi-square test was applied to compare categorical variables. \(P < 0.05\) was considered significant.

**RESULTS**

The total number of babies presenting with RD during the study period was 393, of which 115 patients were connected to BCPAP. The mean gestational age of the study population was 32.37 ± 3.42 weeks. The mean birth weight was 1.65 ± 0.610 kg. 71 were males (61.7%) and 44 were females (38.2%). Inborn babies were 25 (21.7%) and outborn babies were 90 (78.2%) as seen in Table 1.

Out of 115 babies put on BCPAP, 63 (54.7%) were weaned successfully while others (52, 45.2%) required mechanical ventilation and were considered in failure group. The mean duration on CPAP was 2.45 ± 1.27 days.

These neonates with RD categorized according to the body weight to four categories that showed in Table 2. Most of the babies were in the weight category of 1000–1500 g.

Table 3 summarizes the most common reason for starting CPAP which was RDS (\(n = 88, 76.5\%\)), followed by pneumonia (\(n = 14, 12.1\%\)), meconium aspiration syndrome (MAS) (\(n = 10, 8.7\%\)), and transient tachypnea of newborn (TTNB) (\(n = 3, 2.6\%\)).

As depicted in Table 4 there is no statistical significant difference among the gender, weight and gestational age categories with regard to outcome of BCPAP. Table 4a summarizes that there is no significant difference with regard to gender and weight in babies receiving CPAP for RDS, gestational age category showed clinical significance.

<table>
<thead>
<tr>
<th>Table 1: Baseline characteristics of babies on CPAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Mean weight (kg)</td>
</tr>
<tr>
<td>Mean gestational age (weeks)</td>
</tr>
<tr>
<td>SGA</td>
</tr>
<tr>
<td>Gestation ≤30 weeks</td>
</tr>
<tr>
<td>Surfactant</td>
</tr>
</tbody>
</table>

SGA: Small for gestational age
The success rate was better seen in inborn babies (60%; 15 out of 25) than outborn babies (53%; 48 out of 90). The success rate of CPAP was more in babies with TTNB (n = 3, 100%), followed by RDS (n = 51, 57.9%). The success rate was least in cases with MAS (n = 3, 30%).

Table 5 summarizes the distribution of CPAP outcome according to the weight category. The success rate of CPAP has increased as the weight progressed except in birth weight category >2500 g. The number of babies that were discharged was 75 (65.2%).

Table 2: Distribution of cases based on weight category

| Wt category (g) | n (%)
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1000</td>
<td>16 (13.9)</td>
</tr>
<tr>
<td>1000–1500</td>
<td>47 (40.8)</td>
</tr>
<tr>
<td>1501–2500</td>
<td>41 (35.6)</td>
</tr>
<tr>
<td>≥2500</td>
<td>11 (9.5)</td>
</tr>
<tr>
<td>Total</td>
<td>115 (100)</td>
</tr>
</tbody>
</table>

Table 3: Etiology of RD in babies receiving nasal CPAP

<table>
<thead>
<tr>
<th>Cause of RD</th>
<th>Number of babies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>88 (76.5)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>14 (12.1)</td>
</tr>
<tr>
<td>MAS</td>
<td>10 (8.7)</td>
</tr>
<tr>
<td>TTNB</td>
<td>3 (2.6)</td>
</tr>
<tr>
<td>Total</td>
<td>115 (100)</td>
</tr>
</tbody>
</table>

Table 4: Baseline characteristics of infants and CPAP outcome

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total</th>
<th>Success</th>
<th>Failure</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=115</td>
<td>n=63</td>
<td>n=52</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>71</td>
<td>35</td>
<td>36</td>
<td>0.133</td>
</tr>
<tr>
<td>Female</td>
<td>44</td>
<td>28</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Mean weight (kg)</td>
<td>1.650±0.610</td>
<td>1.717±0.625</td>
<td>1.569±0.586</td>
<td>0.197</td>
</tr>
<tr>
<td>Mean gestational age (weeks)</td>
<td>32.28±3.43</td>
<td>32.68±3.29</td>
<td>31.79±3.56</td>
<td>0.165</td>
</tr>
<tr>
<td>Gestational age ≤30 weeks</td>
<td>39</td>
<td>17</td>
<td>22</td>
<td>0.0148</td>
</tr>
</tbody>
</table>

Table 4a: Baseline characteristics of infants receiving CPAP for RDS and outcome

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total</th>
<th>Success</th>
<th>Failure</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=88</td>
<td>n=51</td>
<td>n=37</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>28</td>
<td>26</td>
<td>0.144</td>
</tr>
<tr>
<td>Female</td>
<td>34</td>
<td>23</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Mean weight (kg)</td>
<td>1.475±0.473</td>
<td>1.551±0.492</td>
<td>1.371±0.431</td>
<td>0.078</td>
</tr>
<tr>
<td>Mean gestational age (weeks)</td>
<td>31.28±3.43</td>
<td>31.86±2.92</td>
<td>30.48±2.82</td>
<td>0.030</td>
</tr>
</tbody>
</table>

DISCUSSION

The study was undertaken to assess the outcome of CPAP and factors affecting the success of CPAP in neonates admitted with RD to our NICU. Total of 115 babies including both, preterm and term neonates who received CPAP during the study period were included. The mean birth weight was 1.65 ± 0.610 kg, which is similar to the study conducted by Umran et al.,[9] who also included neonates with all birth weights and different from Koti et al.,[8] de Klerk and de Klerk[10] who included only premature neonates. The mean gestational age in our study was 32.28 ± 3.43, which is similar to the study conducted by Umran et al.[9] 33.4 ± 2.75 (weeks), it’s different with Koti et al.,[8] which was 30.98 ± 2 (weeks).

The mean duration on CPAP was 2.45 ± 1.27 days, similar reported by Umran et al.,[9] 2.85 (days) ± 2.11 different with Koti et al., that was 0.97 days (0.08–6 days range).[8] This difference could be explained by the shortage of human resources and supportive care in our setup.

It was noticed in our study that the gender had no impact on the success of BCPAP which is similar to the found in studies by Koti et al.[8] and Urs et al.[11] It was noticed in our study that the gender, mean weight and mean gestational age had no impact on the success of CPAP which was similar to the study conducted by Sethi et al.,[12] the reason being both the settings are tertiary care centre. Gestational age ≤30 weeks had significant effect on the success of CPAP similar to the study by Ammari et al.[13]
It was found that 63 (54.7%) of cases were weaned successfully from CPAP and 52 (45.2%) of cases failed. Overall, mortality rate was 40 (34.7%). The success rate is almost similar to the study of Sethi et al.\(^{[9]}\) which reported success rate of 60%. The effect of BCPAP was different from Koti et al.\(^{[10]}\) who found 25% failure Sharba et al.\(^{[8]}\) also reported a 66% success rate with CPAP, which is higher than our study. This could be explained by the differences in the study population, deficit of other supportive measures such as total parenteral nutrition, surfactant, and staff experience which can help to further decrease the mortality rate. The success rate in our study may also be lower due to delayed initiation of CPAP especially in outborn neonates.

The success rate of CPAP has increased as the birth weight of the neonates increased except for the weight category of ≥2500 g. This could be explained probably because most of the babies in this weight category had RD due to MAS and pneumonia. In our study, the failure rate in extremely low birth weight babies was 56.2%, which is lower than the failure rate observed by Umran et al.\(^{[9]}\) In study by Ammari et al.\(^{[11]}\) in babies ≤1250 (g) the failure of CPAP was 24%.

The most common indication for CPAP in our study was RDS followed by sepsis, which is similar to the study conducted by Umran et al.\(^{[9]}\) CPAP was successful in 57.9% of cases with RDS and failed in 42% of cases which is also similar to the study by Umran et al.\(^{[9]}\) and Sethi et al.\(^{[12]}\) Gender and birth weight had no significant effect on the outcome of CPAP. Higher gestational age had a significantly positive effect on the success of CPAP similar to the study by Hameed et al.\(^{[13]}\)

The limitation of the present study is proper history could not be captured for the outborn babies as the referral letters were not complete. Further studies need to be done to assess the long-term outcome of the babies and follow-up for the intactness of the survival.

**CONCLUSION**

1. Using BCPAP in the management of RD was effective.
2. Increasing the availability of CPAP machines in the peripheral hospital can further improve the outcome.
3. Empowerment of human resources in tertiary care hospitals is the need of the hour.

**REFERENCES**

An Evaluation of Dysphonia among Teachers

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Abstract

Background: In pursuit of excellence in their profession, school teachers often ignore the most valuable tool in their possession - their voice. Teaching requires a high vocal demand, and consequently, teachers present a high risk of developing voice disorders during the course of their career. The prevalence of current voice disorders is significantly higher in teachers (11%) when compared to non-teachers (6.2%), as is the prevalence of voice disorders during teachers higher in teachers (11%) when compared to non-teachers.

Aim of the Study: To evaluate teachers with dysphonia using voice analysis, objective analysis, acoustic analysis, and aerodynamic analysis.

Materials and Methods: A prospective study on 80 teachers was conducted by dividing them into two groups: 40 teachers each. Group I (GI) included teachers with permanent or frequent voice complaints (>2 months). Group II (GII) teachers included teachers without voice complaints (<2 months). Voice analysis in all the teachers was conducted in the form of self-perception study (voice handicap index [VHI]), and perceptual study (grade, roughness, breathiness, asthenia, and strain [GRBAS]). The objective analysis was performed with stroboscopic evaluation of voice, acoustic analysis, aerodynamic analysis, and the dysphonia severity index. The acoustic analysis was performed using the Vaghmi software; included the fundamental frequency, lowest intensity, jitter, and shimmer. The aerodynamic analysis included the maximum phonation time (MPT) and S/Z ratio. The perceptual analysis, acoustic analysis, and aerodynamic analysis were conducted by a well-trained speech-language pathologist. The dysphonia severity index, which is designed to establish an objective and quantitative correlate of the perceived voice quality, was also calculated.

Observations and Results: The age groups were between 26 and 70 years. The mean age in the GI was 39.98 years, and in the GII was 42.3 years. The mean work experience of the teachers in the study group was 11.08 years, and in the control group was 14.175 years. Among the symptoms with which teachers in the study group presented, the most common symptom was hoarseness (60%). The VHI was perceived as normal by 67.5% of teachers in GI and normal in all subjects of GII group. Vocal nodules were present in 9 (22.5%) teachers belonging to GI group and in 1 teacher from GII group. GRBAS was mildly deviated in 30% of teachers in the study group, and in 35% of teachers in the control group.

Conclusions: Statistically significant differences were noted in the VHI and in the stroboscopic parameters such as glottis closure, vocal fold edge, and mucosal wave pattern. Significant differences were also seen with respect to the fundamental frequency, jitter, shimmer, MPT, and in the dysphonia severity index. The main differences between the two groups in our study were seen with respect to the frequency and number of reporting symptoms, the VHI, stroboscopic analysis, acoustic analysis, aerodynamic analysis, and in the dysphonia severity index.

Key words: Dysphonia severity index, Stroboscopy, Voice, Voice disorders, Voice handicap index

INTRODUCTION

The human voice is a dynamic instrument. In the words of Richard Strauss, “the human voice is the most beautiful instrument of all, but it is the most difficult to play.” Its ability to articulate, communicate ideas, create beautiful melodies, and translate human emotions into sounds is unmatched in the animal kingdom. The sound of each person's voice is unique due to the actual shape and size of the vocal cords as well as the size and shape of the rest of that person's body, especially the chest and vocal tract. Dysphonia is defined as any impairment of the voice or difficulty in speaking. Dysphonia has either organic or functional causes and develops due to impairment in any one of the vocal organs. The prevalence of current voice disorders is significantly higher in teachers (11%) when...
compared to non-teachers (6.2%), as is the prevalence of voice disorders during teachers’ lifetime (i.e., 57.7% teachers vs. 28.8% non-teachers). Smith et al.\(^2\) reported that over 38% of teachers studied complained that teaching had an adverse effect on their voice, and 39% of those teachers had to reduce teaching activities as a result.\(^3\) In a study conducted in India, 49% of teachers reported to have voice problems.\(^4\) Teachers are at an increased risk of developing dysphonia due to a multitude of factors. Very few studies have been conducted to evaluate dysphonia in teachers in India. In a landmark study by Roy et al.,\(^5\) to examine the frequency and adverse effects of voice disorders on teachers and in the general population; they observed that teachers were significantly more likely to have multiple voice symptoms and missed more work days than general populations. Dejonckere et al.\(^6\) proposed a basic protocol for the functional assessment of voice pathology; it included perceptual analysis, videolaryngostroboscopy, acoustic analysis, aerodynamics, and subjective rating by the patient. This study is an attempt on our behalf to highlight the various factors that could contribute to dysphonia among teachers and to assess the voice characteristics of school teachers.

**Period of the Study**
The study period was from October 2015 to September 2017.

**Institute of Period**
The study was conducted at Kannur Medical College, Anjarakandy, Kannur, Kerala, India.

**Subjects of Study**
The study was conducted on school teachers in the Dakshina Kannada district of Karnataka.

**Aim of the Study**
To evaluate teachers with dysphonia using voice analysis, objective analysis, acoustic analysis, and aerodynamic analysis.

**MATERIALS AND METHODS**

This prospective study was conducted at Kasturba Medical College Hospital after attaining clearance by the Institutional Ethics Committee board.

**Inclusion Criteria**
1. School teachers aged above 18 years; who had declared to be active in their profession during the study period were included.
2. Teachers with frequent voice complaints for more than 2 months were included in Group I (GI).
3. Teachers with <2 months of voice complaints were included in Group I (GII).
4. Teachers with chronic voice disorders were included in GI.

**Exclusion Criteria**
1. Teachers with recent upper respiratory tract infections, laryngeal malignancy, laryngotracheal trauma, and history of laryngeal or thyroid surgery, neurological, and neuromuscular diseases were excluded.
2. Teachers not willing to participate in the study were excluded. Teachers with debilitating illnesses were excluded.

A detailed pro forma was filled for each subject with regard to their vocal symptoms, working conditions, associated symptoms, and diseases, as well as the clinical examination findings and voice analysis. The study comprised a total of 80 teachers who were divided into two groups: The study group, Group I \((n = 40)\) included teachers with permanent or frequent voice complaints (frequency more than twice per month) such as hoarseness, vocal fatigue, dry throat, vocal strain, and repeated throat clearing. The control group, Group II \((n = 40)\), included teachers without vocal complaints (frequency less than once per month). Details were sought from each teacher with regard to their vocal symptoms, working conditions, and associated symptoms and diseases, following which they underwent a voice analysis. Voice analysis was conducted in the form of self-perception study (voice handicap index [VHI]), and perceptual study (grade, roughness, breathiness, asthenia, and strain [GRBAS]). The objective analysis included the stroboscopic evaluation of voice, acoustic analysis, aerodynamic analysis and the Dysphonia Severity Index. The acoustic analysis, which was calculated using the Vaghmi software, included the fundamental frequency, lowest intensity, jitter, and shimmer. The aerodynamic analysis included the maximum phonation time (MPT) and S/Z ratio. The perceptual analysis, acoustic analysis, and aerodynamic analysis were conducted by a well-trained speech-language pathologist. The Dysphonia Severity Index, which is designed to establish an objective and quantitative correlate of the perceived voice quality, was also calculated. It is constructed as \([\text{MPT} \times 0.13] + [\text{Fo-High} \times 0.0053] − [\text{I-Low} \times 0.26] − [\text{Jitter} (\%) \times 1.18] + 12.4\). The DSI for perceptually normal voices is +5 and for severely dysphonic voices is −5.\(^7\) A statistical package SPSS version 17 was used to do the data analysis. The qualitative data were analyzed using the Chi-square test, and quantitative data were analyzed using the students unpaired \(t\)-test. Comparisons among the two groups were done using the Fischer’s exact \(t\)-test. Correlations were measured using the Pearson’s correlation coefficient. A probability value of \(<0.05\) was considered significant.
OBSERVATIONS AND RESULTS

The study comprised 80 teachers who were divided into two groups based on their clinical symptoms. The study group (GI) consisted of 40 teachers with permanent or frequent symptoms, and the control group (GII) consisted of 40 teachers without vocal symptoms.

Age
They belonged to an age group varying between 26 years and 70 years. The mean age in the study group was 39.98 years, and in the control group was 42.3 years. There was no statistically significant difference in the age group [Table 1].

Gender
Majority of the teachers were female. Only three male subjects were present in the study, one in the study group, and two in the control group [Figure 1].

Level of Teaching
Primary school teachers were the most common subjects in our study, being equally present in both groups (40%). High school teachers, secondary school teachers, and pre-primary school teachers were less common [Table 2].

Teaching Characteristics
All the teachers had been actively practicing their profession during the period of this study. The mean work experience of the teachers in the study group was 11.08 years, and in the control group was 14.175 years. The teachers in the study group taught their respective subjects for a mean duration of 31.625 h per week, whereas the teachers in the control group taught for a mean duration of 29.775 h per week. Majority of teachers in both the groups taught for more than 30 h per week. There was no statistically significant difference between the number of years they had been teaching, or between the numbers of working hours per week [Table 3].

All the teachers were employed in schools with closed classrooms. All of them used blackboards as a means of visual aid. None of the teachers reported any history of allergy to chalk dust. There was an average of 36.35 students in a classroom being taught by teachers in the study group, and 34.65 students per classroom being taught by teachers in the control group. Voice amplification facilities, such as microphones were not available for any of the teachers. None of the teachers were involved in any vocally demanding activities outside the classroom. None of them had to miss their jobs due to their voice problems. The teachers had an average of two children at home. On comparing the level of hydration being maintained, the teachers in the study group had an average of 10.5 glasses of water per day, whereas the teachers in the control group had 9.9 glasses of water per day. This was not statistically significant.

Table 1: Age distribution in both groups

<table>
<thead>
<tr>
<th>Age</th>
<th>Study group (%)</th>
<th>Controls (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 and below</td>
<td>5 (12.5)</td>
<td>3 (7.5)</td>
<td>8 (10.0)</td>
</tr>
<tr>
<td>31–40</td>
<td>17 (42.5)</td>
<td>16 (40.0)</td>
<td>33 (41.3)</td>
</tr>
<tr>
<td>41–50</td>
<td>14 (35.0)</td>
<td>16 (40.0)</td>
<td>30 (37.5)</td>
</tr>
<tr>
<td>Above 50</td>
<td>4 (10.0)</td>
<td>5 (12.5)</td>
<td>9 (11.3)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (100.0)</td>
<td>10 (100.0)</td>
<td>80 (100.0)</td>
</tr>
</tbody>
</table>

Table 2: Distribution of teachers by level of teaching

<table>
<thead>
<tr>
<th>Level of teaching</th>
<th>Study group (%)</th>
<th>Controls (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre primary</td>
<td>6 (15.0)</td>
<td>5 (12.0)</td>
<td>11 (13.8)</td>
</tr>
<tr>
<td>Primary</td>
<td>16 (40.0)</td>
<td>16 (40.0)</td>
<td>32 (40.0)</td>
</tr>
<tr>
<td>Secondary</td>
<td>10 (25.0)</td>
<td>9 (22.5)</td>
<td>19 (23.8)</td>
</tr>
<tr>
<td>High</td>
<td>8 (20.0)</td>
<td>10 (25.0)</td>
<td>18 (22.5)</td>
</tr>
<tr>
<td>Total</td>
<td>40 (100.0)</td>
<td>40 (100.0)</td>
<td>80 (100.0)</td>
</tr>
</tbody>
</table>

Table 3: Teaching characteristics

<table>
<thead>
<tr>
<th>Working conditions</th>
<th>GI N (%)</th>
<th>GII N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>19 (47.5)</td>
<td>12 (30)</td>
<td>0.108</td>
</tr>
<tr>
<td>10–15</td>
<td>8 (20)</td>
<td>12 (30)</td>
<td>0.301</td>
</tr>
<tr>
<td>15–20</td>
<td>8 (20)</td>
<td>10 (25)</td>
<td>0.592</td>
</tr>
<tr>
<td>&gt;20</td>
<td>5 (12.5)</td>
<td>6 (15)</td>
<td>0.745</td>
</tr>
<tr>
<td>Working hours per week (h)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–25</td>
<td>9 (22.5)</td>
<td>10 (25)</td>
<td>0.792</td>
</tr>
<tr>
<td>25–30</td>
<td>4 (10)</td>
<td>8 (20)</td>
<td>0.210</td>
</tr>
<tr>
<td>&gt;30</td>
<td>27 (67.5)</td>
<td>22 (55)</td>
<td>0.251</td>
</tr>
<tr>
<td>Number of students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>3 (7.5)</td>
<td>1 (2.5)</td>
<td>0.304</td>
</tr>
<tr>
<td>30–35</td>
<td>7 (17.5)</td>
<td>8 (20)</td>
<td>0.774</td>
</tr>
<tr>
<td>35–40</td>
<td>17 (42.5)</td>
<td>24 (60)</td>
<td>0.117</td>
</tr>
<tr>
<td>&gt;40</td>
<td>13 (32.5)</td>
<td>7 (17.5)</td>
<td>0.121</td>
</tr>
</tbody>
</table>
Symptoms
Among the symptoms with which teachers in the study group presented, the most common symptom was hoarseness (60%). Other symptoms included increased vocal strain (52.5%), dryness of throat (20%), change in pitch (30%), frequent throat clearing (37.5%), vocal fatigue (12.5%), and weakness of voice (10%). 35% of the teachers in the study group had only one symptom. 27.5% of them had two symptoms, and 37.5% of them had three or more symptoms. In the control group hoarseness was present in only 15% of the teachers. Other symptoms included strain (10%), dry throat (5%), change in pitch (5%), and weakness of voice (5%). 72.5% of these teachers did not have any symptoms, and only 5% of the teachers had more than three symptoms [Table 4].

The comparative analysis of symptoms of both the groups is shown in Figure 2.

Symptoms of laryngopharyngeal reflux disease were present in 50% of the teachers in the study group, whereas it was present in only 25% of the teachers in the control group. This difference was statistically significant.

VHI: The functional, emotional and physical aspects of the voice disorder, as detected by the VHI were analyzed. It quantifies the voice disorder by categorizing the voice handicap as normal (<33), mild (>33), moderate (>44), or severe (>61). On evaluating the VHI, it was perceived as normal by 67.5% of teachers in the study group. It was perceived as mild and moderate by 15% each. One teacher (2.5%) perceived her VHI to be severe. All the teachers in the control group perceived their VHI to be normal [Tables 5 and 6].

Stroboscopy
On stroboscopic evaluation, vocal nodules were the most common structural lesion involving the larynx. It was present in 9 (22.5%) teachers belonging to the study group and in one teacher from the control group. Other structural abnormalities included the presence of vocal polyps in 3 (7.5%) teachers from the study group, congestion of the vocal cords, and thickening of the vocal cords [Figures 3-5 and Table 7].

The glottic closure was found to be normal in 60% of teachers in the study group, and in 92.5% of teachers in the control group. It was mildly deviated in 40% of teachers in the study group, and in 7.5% of teachers in the control group. These results were very highly significant. The periodicity of the vocal cords was found to be normal in 97.5% of teachers in the study group, and in all the teachers in the control group. It was mildly deviated in 1 (2.5%) of the teachers in the study group. The symmetry of movement of the vocal cords was found to be normal in 95% of teachers in the study group, and in all the teachers in the control group. It was mildly deviated in 5% of teachers in the study group. The amplitude of the vocal cords was normal in all the teachers in the study group, and in 97.5% of teachers in the control group. It was mildly deviated in 1 (2.5%) of the teachers in the control group. The mucosal wave pattern was normal in 67.5% of teachers in the study group, and in 87.5% of teachers in the control group. It was mildly deviated in 20% of teachers in the study group, and in 12.5% of teachers in the control group. The mucosal wave pattern showed moderate deviation in 12.5% of the teachers in the study group. These differences were statistically significant. The vocal fold edges were normal in 70% of the teachers in the study group, and in 95% of teachers in the control group. It was mildly deviated in 15% of teachers in the study group and in 2.5% of the teachers in the control group. It was moderately deviated in 15% of teachers in the study group and in 7.5% of the teachers in the control group.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>GI (%)</th>
<th>GII (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoarseness</td>
<td>24 (60)</td>
<td>6 (15)</td>
<td>0.0015</td>
</tr>
<tr>
<td>Strain</td>
<td>21 (52.5)</td>
<td>4 (10)</td>
<td>0.0024</td>
</tr>
<tr>
<td>Dry throat</td>
<td>15 (37.5)</td>
<td>2 (5)</td>
<td>0.0013</td>
</tr>
<tr>
<td>Pitch</td>
<td>12 (30)</td>
<td>2 (5)</td>
<td>0.025</td>
</tr>
<tr>
<td>Fatigue</td>
<td>5 (12.5)</td>
<td>0 (0)</td>
<td>0.089</td>
</tr>
<tr>
<td>Throat clearing</td>
<td>4 (10)</td>
<td>0 (0)</td>
<td>0.040</td>
</tr>
<tr>
<td>Weakness</td>
<td>8 (20)</td>
<td>2 (5)</td>
<td>0.042</td>
</tr>
</tbody>
</table>

Significant difference in hoarseness, strain, dryness of throat, change in pitch, throat clearing, and weakness was observed (P < 0.05). GI: Group I, GII: Group II

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>27 (67.5)</td>
<td>6 (15)</td>
<td>6 (15)</td>
<td>1 (2.5)</td>
</tr>
<tr>
<td>GII</td>
<td>40 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

GI: Group I, GII: Group II, VHI: Voice handicap index
The GRBAS were evaluated and revealed the following results. The grade was found to be normal in 57.5% of teachers in the study group, and in 50% of teachers in the control group. It was mildly deviated in 30% of teachers in the study group, and in 35% of teachers in the control group. The grade showed moderate deviation in 12.5% of teachers in the study group, and in 15% of teachers in the control group. The roughness of voice was perceived to be normal in 87.5% of teachers in the study group, and in 77.5% of teachers in the control group. It was mildly deviated in 12.5% of teachers in the study group, and 22.5% of teachers in the control group. Breathiness of voice was normal in 60% of teachers in the study group and in 45% of teachers in the control group. It was mildly deviated in 15% of teachers in the study group, and in 25% of teachers in the control group. These results were statistically significant [Table 8].

### Table 6: Voice handicap index

<table>
<thead>
<tr>
<th>Effects</th>
<th>N (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty being understood</td>
<td>27 (67.5)</td>
<td>10 (25)</td>
</tr>
<tr>
<td>Reduction in phone calls</td>
<td>24 (60)</td>
<td>8 (20)</td>
</tr>
<tr>
<td>Avoid people because of voice</td>
<td>23 (57.5)</td>
<td>7 (17.5)</td>
</tr>
<tr>
<td>Reduction in social activities</td>
<td>19 (47.5)</td>
<td>9 (22.5)</td>
</tr>
<tr>
<td>Loss of income because of voice</td>
<td>6 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Difficulty being understood in a noisy room</td>
<td>12 (30)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Family has difficulty hearing me at home</td>
<td>6 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Speak with friends less often</td>
<td>4 (10)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>People ask to repeat myself</td>
<td>15 (37.5)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Left out of conversations</td>
<td>9 (22.5)</td>
<td>1 (2.5)</td>
</tr>
<tr>
<td><strong>Emotional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tense on talking</td>
<td>22 (55)</td>
<td>8 (20)</td>
</tr>
<tr>
<td>Being upset</td>
<td>28 (70)</td>
<td>7 (17.75)</td>
</tr>
<tr>
<td>Voice makes me feel handicapped</td>
<td>21 (52.5)</td>
<td>4 (10)</td>
</tr>
<tr>
<td>Being ashamed</td>
<td>13 (32.5)</td>
<td>3 (7.5)</td>
</tr>
<tr>
<td>People are irritated with my voice</td>
<td>9 (22.5)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>People do not understand the problem</td>
<td>18 (48)</td>
<td>7 (17.5)</td>
</tr>
<tr>
<td>Less outgoing</td>
<td>8 (20)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Speech makes me handicapped</td>
<td>6 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Feels incompetent</td>
<td>6 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Annoyed when asked to repeat</td>
<td>8 (20)</td>
<td>2 (5)</td>
</tr>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run out of air on talking</td>
<td>21 (52.5)</td>
<td>6 (15)</td>
</tr>
<tr>
<td>Voice varies throughout the day</td>
<td>30 (75)</td>
<td>8 (20)</td>
</tr>
<tr>
<td>People enquire about the voice</td>
<td>28 (70)</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Voice sounds creaky and dry</td>
<td>24 (60)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Have to strain to produce voice</td>
<td>27 (67.5)</td>
<td>9 (22.5)</td>
</tr>
<tr>
<td>Clarity of voice is unpredictable</td>
<td>24 (60)</td>
<td>10 (25)</td>
</tr>
<tr>
<td>Try to change my voice</td>
<td>10 (25)</td>
<td>3 (7.5)</td>
</tr>
<tr>
<td>Great effort to speak</td>
<td>13 (32.5)</td>
<td>5 (12.5)</td>
</tr>
<tr>
<td>Voice worse in evenings</td>
<td>27 (67.5)</td>
<td>11 (27.5)</td>
</tr>
<tr>
<td>Voice gives out during speech</td>
<td>11 (27.5)</td>
<td>3 (7.5)</td>
</tr>
</tbody>
</table>

Gi: Group I, GII: Group II. Significant difference in all parameters
32.5% of teachers in the study group and 40% of teachers in the control group. It was moderately deviated in 7.5% of teachers in the study group and 15% of teachers in the control group. The asthenia of voice was perceived to be normal in 95% of teachers in the study group and in 97.5% of teachers in the control group. Vocal strain was normal in 80% of teachers in the study group and 87.5% of teachers in the control group. It was mildly deviated in 15% of teachers in the study group and in 12.5% of teachers in the control group. It was moderately deviated in 5% of teachers in the study group [Table 9].

Acoustic Analysis
Acoustic analysis included the fundamental frequency, lowest intensity, jitter, and shimmer.

Fundamental frequency
The mean fundamental frequency was only 177.33 in the study group, whereas it was 193.296 in the control group. This difference was very highly significant [Table 10].

Intensity
The mean lowest intensity was 81.275 in the study group and 81.225 in the control group. There was no statistical significance.

Jitter
The mean jitter was 3.049 in the study group and 2.112 in the control group. This difference was statistically significant.

Shimmer
The mean shimmer was 3.123 in the study group and 2.844 in the control group. This difference was not statistically significant.

Aerodynamic Analysis
MPT
The MPT was found to be only 11.7 s in the study group and 12.950 s in the control group. This was highly significant [Table 11].

S/Z ratio
The S/Z Ratio was 0.972 in both the groups.

Dysphonia Severity Index
The Dysphonia Severity Index was severely affected in both the groups.

The normal values may range between −5 and +5. A more negative value of DSI indicates a poorer quality of voice. It was −8.836 in the study group and −8.316 in the control group. The difference was statistically significant [Figure 6].

Table 8: Variations on stroboscopy

<table>
<thead>
<tr>
<th>Lesions on vocal cord</th>
<th>Normal (N)</th>
<th>Mild (N)</th>
<th>Moderate (N)</th>
<th>Severe (N)</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure</td>
<td>24 (60)</td>
<td>16 (40)</td>
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<td>40 (100)</td>
</tr>
<tr>
<td>Amplitude</td>
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<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Periodicity</td>
<td>39 (97.5)</td>
<td>1 (2.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Symmetry</td>
<td>38 (95)</td>
<td>2 (5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Wave</td>
<td>27 (67.5)</td>
<td>8 (20)</td>
<td>5 (12.5)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Edge</td>
<td>28 (70)</td>
<td>6 (15)</td>
<td>6 (15)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>GII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure</td>
<td>37 (92.5)</td>
<td>3 (7.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Amplitude</td>
<td>39 (97.5)</td>
<td>1 (2.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Periodicity</td>
<td>40 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Symmetry</td>
<td>40 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Wave</td>
<td>36 (90)</td>
<td>4 (10)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Edge</td>
<td>38 (95)</td>
<td>1 (2.5)</td>
<td>1 (2.5)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
</tbody>
</table>

GI: Group I, GII: Group II. Significant difference in glottis closure, mucosal wave pattern, and vocal fold edge

Table 9: Deviations in GRBAS score

<table>
<thead>
<tr>
<th>Alterations</th>
<th>Normal (N)</th>
<th>Mild (N)</th>
<th>Moderate (N)</th>
<th>Severe (N)</th>
<th>Total (N)</th>
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<tbody>
<tr>
<td>GI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>23 (57.5)</td>
<td>12 (30)</td>
<td>5 (12.5)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>R</td>
<td>35 (87.5)</td>
<td>5 (12.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>B</td>
<td>24 (60)</td>
<td>13 (32.5)</td>
<td>3 (7.5)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>A</td>
<td>38 (95)</td>
<td>2 (5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>S</td>
<td>32 (80)</td>
<td>6 (15)</td>
<td>2 (5)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>GII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>20 (50)</td>
<td>14 (35)</td>
<td>6 (15)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>R</td>
<td>31 (77.5)</td>
<td>9 (22.5)</td>
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<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>B</td>
<td>18 (45)</td>
<td>16 (40)</td>
<td>6 (15)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>A</td>
<td>39 (97.5)</td>
<td>1 (2.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>S</td>
<td>35 (87.5)</td>
<td>5 (12.5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>40 (100)</td>
</tr>
</tbody>
</table>

GI: Group I, GII: Group II, GRBAS: Grade, roughness, breathiness, asthenia, and strain. No significant difference between any of the parameters

Table 10: Acoustic analysis

<table>
<thead>
<tr>
<th>Acoustic analysis</th>
<th>GI</th>
<th>GII</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>Fo</td>
<td>177.334</td>
<td>193.272</td>
<td>0.000</td>
</tr>
<tr>
<td>Io</td>
<td>81.275</td>
<td>81.175</td>
<td>0.278</td>
</tr>
<tr>
<td>Jitter</td>
<td>3.123</td>
<td>2.845</td>
<td>0.034</td>
</tr>
</tbody>
</table>

GI: Group I, GII: Group II. Significant difference in Fo, Jitter, and Shimmer

Table 11: Aerodynamic analysis

<table>
<thead>
<tr>
<th>Aerodynamic analysis</th>
<th>GI</th>
<th>GII</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPT</td>
<td>11.700</td>
<td>12.950</td>
<td>0.009</td>
</tr>
<tr>
<td>S/Z ratio</td>
<td>0.972</td>
<td>0.972</td>
<td>0.314</td>
</tr>
</tbody>
</table>

Significant difference in MPT. MPT: Maximum phonation time

On correlating the various working conditions of all 80 teachers in our study with the quantitative parameters of voice analysis, there was found to be no significant associations. We did not find any significant association between the total number of years in the profession and
Majeed and Haneefa: Evaluation of Dysphonia among Teachers

Figure 6: Dysphonia severity index values

dysphonia. Although the teachers worked for prolonged hours, and for a large number of students, we did not find any significant correlation between these factors and the risk of developing dysphonia.

DISCUSSION

The age of the 80 school teachers we analyzed was comparable between the two groups, but the teachers in the study group tended to be of a younger age. This could be due to the fact that teachers in India have no vocal training before getting into a profession with a high vocal demand. A study conducted in Taiwan also reported the absence of any significance between age group and dysphonia.[7] Roy et al.[8] and Smith et al.[9] found a higher prevalence of voice disorders in teachers more than 50 years of age which was attributed to the cumulative effect on voice as the personages. Hormonal changes with aging and menopause may also affect the quality of voice.[10] Almost all of our subjects were females, which signify the high proportion of females among the teaching profession in Indian schools. Females are more prone to dysphonia due to the reduced length of the vocal cords which may hinder phonic adaptations for heavy voice use. They also produce voice at a higher fundamental frequency. Consequently, there is less tissue mass to dampen a larger number of vibrations.[11] Hyaluronic acid, which increases water flow to the lamina propria of the vocal folds resulting in a shock absorbing action during voice emission, is also less in females.[10] Majority of our subjects were primary school teachers. Primary school teachers usually report excessive noise in their classrooms, and they tend to raise their voice so as to be heard above the background noise. As they usually teach all the subjects by themselves, they do not receive appropriate breaks in between their classes. Our findings were similar to the findings by Angelillo et al.[11] who, on studying the relationship between the level of teaching and dysphonia, reported that if the students were younger, the prevalence of voice disorders increased in teachers. However, in a study conducted in Brazil, it was suggested there is an increased risk of developing dysphonia if the teachers had worked for more than 15 years, and for more than 22 h per week.[12] Crowded classrooms and excessive noise as measured by Sound Level Meter were also identified as definite risk factors in the development of dysphonia.[13] There was a significant difference in the reporting of voice symptoms among the two groups. Even though teachers in both the groups had similar working conditions, the study group had a significantly higher number of symptoms. The most common symptom was hoarseness (60%). As in our study, hoarseness was found to be the predominant symptom in studies conducted by Roy et al.,[14] Smith et al.,[15] and Sapir et al.[16] Hoarseness, vocal strain and dryness of throat were the major self-perceived symptoms of voice disorder for the teachers in our study. A large proportion of teachers in the study group also had multiple symptoms (65% > 1, 37.5% > 3). This shows that teachers who develop voice problems usually report multiple voice symptoms. However, it should be kept in mind that the number of symptoms reported by teachers in our study cannot be compared to other studies, due to the different number of total symptoms considered by different authors,[17] for example, the number of total symptoms considered in our study was seven, while the corresponding number in Roy et al.’s[18] study was 14. On evaluating the working condition at the schools, we found that teachers had to work continuously for prolonged hours. Teachers in both the groups had been in their profession for many years and worked between 20 and 46 h per week. Majority of the teachers worked for more than 30 h per week. No significant difference was found in the number of years in the profession and the number of working hours per week between the two groups. Nor were there any differences in the grades taught and the number of students per classroom. The number of students per classroom was high. Majority of the classrooms had more than 30 students, resulting in a high student-teacher ratio. We found no correlation between the working conditions as listed above, with either the objective or subjective parameters evaluated in this study. Laryngopharyngeal reflux disease is a well-recognized risk factor in the development of dysphonia, wherein the mucosa is exposed to constant acid reflux which can cause laryngeal lesions.[19] Although we did not objectively evaluate for laryngopharyngeal reflux disease, patients did complain of associated symptoms such as throat clearing, hoarseness, chronic cough, and sore throat. This could indicate the underlying presence of reflux disease. We discovered a significantly higher prevalence of these symptoms among teachers in the study group (50%) when compared to the control group (25%). The VHI is regarded as the “gold standard” for measuring the subjective burden due to dysphonia.[20] It reflects a patient’s judgment about the impact of his voice disorder.
on daily life. It is also used as a tool for outcome measurements.[14] Moreover, it enables us to form an impression about how concerned the individual is regarding their voice problem. The VHI was deviated in 13 (32.5%) of the teachers in the study group, and it was normal for all the teachers in the control group. Teachers with voice disorders experienced reduced communicative ability, reduced social activities, decreased the number of phone calls they made, and felt that their emotional state was affected. They were easily upset as a result of their voice problem. These results were consistent with previously undertaken studies.[17,18] On evaluating the GRBAS score, the grade, roughness and breathiness were affected in both the groups. Interestingly, the control group of teachers who had perceived their own voice to be normal, and who had few voice symptoms had higher GRBAS scores. 60% of the teachers in the control group had deviations in the GRBAS score, whereas only 47.5% of the teachers in the study group had such deviations. Similar findings were reported by other studies as well.[19,20] We further attempted to analyze as to why the control group was affected more with a poorer quality of voice on perceptual analysis. This could be due to the fact that if the changes in the voice are gradual, occurring over a long period of time, many of the teachers may consider it to be a normal process and do not perceive it as a problem. Furthermore, many teachers consider dysphonia and voice-related problems to be an occupational hazard that they have to bear within their profession. During the course of their careers these teachers could develop compensatory strategies or techniques to minimize the difficulty in voice production which may have an effect on their perception of voice quality. However, our findings were inconsistent with Meulenbroek and de Jong,[21] who reported the GRBAS score to be more affected in teachers with vocal complaints than with the control group. Stroboscopic exam is a valuable part of the evaluation of people with dysphonia. It offers more information about the presence or absence of pathological as well as of healthy voices appear to be significant alterations in the vocal fold edge, limited mucosal wave of the vocal folds, and incomplete glottic closure. The abnormalities in glottis closure can cause air loss, thereby resulting in a change of voice and reduced vocal capabilities.[3] Acoustic measures allow for objective quantification of voice quality. Acoustic analysis was done utilizing the Vaghmi software. The various parameters evaluated included the fundamental frequency, the lowest intensity, jitter, and shimmer.

**Fundamental Frequency**

The fundamental frequency range best discriminates between teachers with effective and ineffective voice. The fundamental frequency also helps in distinguishing between individuals with varying degrees of vocal fatigue.[12] In our study, the fundamental frequency was significantly reduced in the study group. Increased vocal effort by the teachers could probably result in increased muscle tone and reduced phonatory control.[24]

**Intensity**

The intensity levels were normal in both the groups in our study. However, the intensity may be reduced due to inadequate closure of the vocal cords.[25]

**Jitter and Shimmer**

The jitter and shimmer values are not very reliable as their values vary considerably between different studies.[26] On aerodynamic analysis, the MPT was significantly reduced in the study group. MPT may be reduced due to a decrease in the vital capacity or larynx dysfunction.[27] In our study, the Dysphonia Severity Index was negative in both the groups, which indicates the poor quality of voice in both the groups. However, it was more negative in the study group with a statistically significant difference when compared to the study group. The deviation noted in the DSI could be due to the decrease in the fundamental frequency and MPT. In the literature, the DSI is regarded to be unisex because the gender-related parameters of highest frequency (higher in female voices) and MPT (longer in male voices) of pathological as well as of healthy voices appear to be compensated in the DSI formula.[28,29]

**SUMMARY**

Statistically significant differences were noted in the VHI and in the stroboscopic parameters such as glottis closure, vocal fold edge, and mucosal wave pattern. Significant differences were also seen with respect to the fundamental frequency, jitter, shimmer, MPT, and in the Dysphonia Severity Index. The main differences between the two groups in our study were seen with respect to the frequency and number of reporting symptoms, the VHI, stroboscopic examination, and GRBAS evaluation.

**GRBAS score**

The grade, roughness, breathiness, and strain are evaluated in the GRBAS score. The grade refers to the perception of the severity of voice problems. Roughness refers to the presence of breathiness or harshness in the voice. Breathiness refers to the perception of air escape or strain in the voice. Strain refers to the perception of effort or tension in the voice.

**VHI**

The Voice Handicap Index (VHI) is a self-report questionnaire that measures the impact of voice disorders on daily life. It consists of 30 items that are scored on a 5-point Likert scale ranging from 0 (no problem) to 4 (severe problem). The total score is calculated by adding up the scores of all items, and it ranges from 0 to 120. A higher score indicates a greater impact of voice disorders on daily life.

**DSI**

The Dysphonia Severity Index (DSI) is a subjective measure that evaluates the quality of voice. It is calculated by subtracting the score of the lowest intensity from the score of the highest intensity. A negative DSI score indicates the presence of dysphonia, and a positive DSI score indicates a normal voice.

**MPT**

The MPT (maximum phonation time) is the maximum length of time a person can sustain a constant pitch and loudness without voice loss. It is measured in seconds.

**Acoustic analysis**

Acoustic analysis is a technique used to analyze the quality of voice. It involves the measurement of various acoustic parameters such as fundamental frequency, intensity, jitter, and shimmer. These parameters are used to assess the vocal quality and to identify any abnormality in voice production.

**Stroboscopic examination**

Stroboscopic examination is a technique used to visualize the vocal folds during phonation. It provides a detailed view of the vocal folds and helps in identifying any abnormalities such as vocal nodules, polyps, Reinke’s edema, sulcus vocalis, and vocal cysts. Stroboscopic examination is valuable in the evaluation of people with dysphonia and allows for a more detailed assessment of voice quality.

**Mucosal wave pattern**

The mucosal wave pattern is a visualization technique used in stroboscopic examination. It provides a detailed view of the mucosal movement of the vocal folds and helps in identifying any abnormalities.

**Dysphonia**

Dysphonia refers to any abnormality in the voice that affects its quality and function. It can be caused by various factors such as vocal misuse, voice disorders, and underlying medical conditions. Dysphonia can affect the quality of voice significantly, making it difficult to communicate effectively. It can impact daily life, social activities, and mental well-being.
CONCLUSIONS

The teaching population in India works for prolonged hours in acoustically poor environments and are highly susceptible to voice problems. Many teachers do have significant voice problems, even if they do not perceive any voice disorder themselves. Objective evaluation of voice must be considered in any teacher; however, insignificant their voice problem may seem.

REFERENCES

Clinical Evaluation of Dysphagia with Bedside Tests and FEES in Patients with Aspiration - A Comparative Study

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Abstract

Background: Aspiration while swallowing is a common complaint among the elderly patients. The tests that predict aspiration can be few bedside tests or use of fiberoptic endoscopic evaluation of swallowing (FEES). The latter is an evidence-based test in confirming the aspiration.

Aim of the Study: To assess and compare the values of the bedside tests and FEES in the confirmation of aspiration while swallowing.

Materials and Methods: A total of 86 patients with complaints of aspiration while swallowing were included. The patients were assessed using bedside tests (water swallow test, pulse oximetry, and gag reflex). FEES was also performed in these patients to detect sensitivity and specificity in comparison with bedside tests.

Observations and Results: There were 53 male and 33 female patients. The mean age was 53.86 ± 4.15 years. Dysphagia for solids was present in 60.46% of the patients. Bedside tests showed 71% sensitivity and 64% specificity when correlated with FEES. Moreover, a combination of voice change and choking/cough results in a sensitivity of 86.5% and specificity of 75.2%.

Conclusion: The bedside tests are equally important and have high sensitivity in evaluating patients with dysphagia. Using combination of choking/cough and change of voice as parameters of aspiration when compared to FEES showed high sensitivity and specificity.

Key words: Bedside tests, Bedside tests and fiberoptic endoscopy, Cricopharyngeal, Dysphagia, Fiberoptic endoscopic evaluation of swallowing, Pharynx, Solids

INTRODUCTION

The spectrum of difficulty in relishing the food in human beings varies from simple raw sensation in the throat while swallowing at one end, to difficulty in swallowing one’s own saliva at the extreme end. The stages of the spectrum include pain, difficulty, or discomfort during the progression of the bolus from the mouth to the stomach. The difficulty in swallowing may be for solids or liquids or both. Anatomically the dysphagia may result due to pathology in the mouth to the lower end of esophagus. It may be due to purely organic diseases or functional disturbances. The oropharyngeal causes of dysphagia include stroke, post-radiotherapy sequelae, reflux esophagitis, and cricopharyngeal muscle dysfunction. Dysphagia affects the quality of life of the individual, his life expectancy and may lead to complications and economic burden. The complications may be due to aspiration of ingested materials resulting in chest infection, malnutrition, and airway obstruction. Hence, it is imperative on ENT surgeons to detect the causes of dysphagia and the aspiration at an early stage to enable to start rehabilitative measures. The benefit to the patient, in terms of improvement in the quality of life, cannot be underestimated. Review of literature showed many authors attempted to find the utility and efficacy of different methods in identifying aspiration...
and showed varying degrees of sensitivity and specificity for their tests. Bedside tests also may be used to identify patients with oropharyngeal dysphagia and those at risk of aspiration. The main clinical indicators of dysphagia at bedside tests are (1) abnormal volitional cough, (2) abnormal gag reflex, (3) dysphonia, (4) dysarthria, (5) cough after swallow, and (6) change of voice after swallow. Teissmann et al. reported 30% incidence of aspiration in their study of patients with dysphagia and half of them without cough (silent aspiration) and 45% with oropharyngeal residue. Fiberoptic endoscopic evaluation of swallowing (FEES) was developed and popularized by Langmore and modified by Flaksman et al. It has become one of the important tests for evaluation of the anatomy of the pharynx and larynx and assessment of the process of swallowing in recent times. FEES is being used as an evidence-based investigative tool in the assessment of the oropharyngeal stage of the swallow process to identify the anatomical site and in visualization of the larynx and diagnosis of aspiration by many authors. These authors also stated that FEES is an easy, efficient and reliable method to evaluate the swallowing status in stroke patients, moreover, in combination with good bedside clinical examination and swallow exercises, it can be a good tool in assessing patients with post-stroke dysphagia. Post-stroke rehabilitation and prevention of aspiration pneumonia can be effectively done with the help of FEES. The present study was conducted in that context to assess the sensitivity and specificity of bedside tests and compares them with FEES.

**Aim of the Study**
To assess and compare the values of the bedside tests and FEES in the confirmation of aspiration while swallowing.

**Duration of Study**
The study was from March 2012 to February 2015 (4 years).

**Institute of Study**
The study was conducted at the Department of ENT, Kurnool Medical College, Kurnool, Andhra Pradesh.

**MATERIALS AND METHODS**

A total of 86 patients attending the Department of ENT Outpatient Department with complaints of dysphagia were included in the present study. An Ethical Committee clearance certificate was obtained, and an Ethical Committee cleared consent form was used before commencing the study.

**Inclusion Criteria**
1. Patients of aged above 45 years and below 70 years were included.
2. Patients with complaints of dysphagia were included.
3. Patients with dysphagia with or without aspiration were included.
4. Patients referred to the OPD before weaning them from nasogastric feeding tube were included.

A thorough clinical history was obtained from the patients and attenders of the patients. The patients were evaluated for level of consciousness, cooperation, verbal, oral apraxia, and articulation.

**Exclusion Criteria**
1. Patients who cannot obey verbal orders were excluded.
2. Patients with markedly impaired degree of consciousness were excluded.
3. Patients with receptive aphasia or with significant apraxia were excluded from the study.

The bedside assessment of the patients for aspiration was done by assessing cognitive status, gag reflex, voluntary cough, and throat clearing. If the above steps were possible, assessment of saliva was done. Saliva assessment: Crary MA et al. state that spontaneous swallowing of saliva and swallowing frequency were assessed. If it is proved impossible to control and swallow saliva, the examination was terminated. Water swallow test (WST): The patient was examined in the sitting position or in 45° reclining position. Few were tested in recumbent position due to difficult positioning. The patient was given 5 ml of water, and when the patient could tolerate that amount of water, he/she was given 20 ml followed by 50 ml of water (thin fluid) and assessed for cough/choking during or after swallowing, wet or weak cough after swallowing. Furthermore, the patient was asked to produce sustained vowel o/a/e before and after swallowing of water. Voice change after swallowing was observed and recorded. Pulse oximetry according to Zaidi et al. was done for the patients before FEES and for 5 min after the test and results were recorded. 3% or more reduction in oxygen saturation was considered the positive test. FEES was done in all patients who passed a saliva test. The patient was seated for FEES in the sitting position (whenever possible) however, in some cases, this was not possible, instead, a semi-upright position on the bed was adopted. The flexible fiberoptic laryngoscope was inserted through trans nasal route into the pharynx. It provided detailed information about the anatomy of the nose, pharynx, and larynx. Sensation could be tested by touching the tip of the endoscope to various areas of the larynx and reflex adduction of the vocal folds or reflex cough, and choking were observed. Different food consistencies as fluids (water), semisolids (thick juice/yoghurt) and solids (piece of biscuits or bread), and mixed with blue dye, were used to evaluate swallowing. The salient findings noted were residue, penetration and aspiration.
into the larynx. All the data recorded were analyzed using standard statistical methods.

**OBSERVATIONS AND RESULTS**

Among the 86 patients evaluated with bedside tests for dysphagia, there were 53 male and 33 female patients. The patients belonged to the age groups of 45–70 years with a mean age of 53.86 ± 4.15 years [Table 1].

The bedside tests could be performed in an average time of 15.35 ± 2.60 min whereas FEES in about 10.70 ± 1.10 min.

The different types of diseases wherein the aspiration was evaluated in the study included 16 (18.60%) post road traffic accident (RTA) patients, 32 patients (37.20%) with neurological deficit such as cerebrovascular accidents (CVA), cerebral hemorrhage, cerebral contusion, 24 (27.90%) patients following surgical treatment of pharynx, larynx with or without radiotherapy and 14 (16.27%) patients with malignant diseases of the oropharynx, hypopharynx, and larynx [Table 2].

Among these 86 patients bedside tests were done, and FEES was also done to compare and determine sensitivity, specificity, and predictive values. Cough/choking for all test subjects showed a sensitivity of 71.35%, specificity of 69.20%, PPV of 68.50%, and NPV of 72.50%. The sensitivity of change of voice was 76.40%, specificity was 72.50%, PPV was 71.10%, and NPV was 67.30%. The sensitivity of gag reflex was 52.45%, specificity was 55.10%, PPV was 50.35%, and NPV was 53.2% [Table 3]. In this study, aspiration was observed in 69% of patients with decreased or absent laryngeal sensation tested by touching laryngeal structures by the tip of the endoscope during FEES. However, 31% of the patients demonstrated that normal laryngeal sensations in patients showed aspiration during FEES. By combining the two tests of the cough/choking (during or after swallowing) and change of voice (after swallowing) showed a sensitivity of 82.15%, specificity of 79.35%, PPV of 80.40%, and NPV of 79.20% [Table 3].

Among the 86 patients dysphagia for solids was present in 60.46% of the patients. The combination of bedside tests, voice change and choking/cough showed increasing the results in sensitivity of 82.15% and specificity of 79.35% [Table 3].

**DISCUSSION**

Evaluating the patients with the aspiration of fluids and solids into the respiratory tract is a major challenge to ENT surgeons as these patients are referred to them. The common diagnostic methods used are X-ray chest plain and contrast materials followed by fiberoptic endoscopic swallowing examination (FEES) and videofluoroscopy. The latter methods are used because they are technically demanding. However, in everyday practice, a thorough clinical history taking and obtaining meaningful information on a patient’s swallowing ability using standardized simple bedside clinical tests cannot be overruled. These tests are swallow tests with water, modified in a variety of ways[6,12,13] modified by Okubo et al.[16] who combined cough/choking and change of voice following swallow by the patient of given saline. In the present study, the different types of diseases wherein the aspiration was evaluated in the study included 16 (18.60%) post RTA patients, 32 patients (37.20%) with neurological deficit such as CVA, cerebral hemorrhage, cerebral contusion, 24 (27.90%) patients following surgical treatment of pharynx, larynx with or without radiotherapy and 14 (16.27%) patients with malignant diseases of the oropharynx, hypopharynx, and larynx. In a study by Hoy et al.[16] the mean age of the entire cohort was 62 ± 13.5 years, and 58% of the cohort was males. The most common identified causes of dysphagia were laryngopharyngeal reflux disease (LPRD) (27%), post-irradiation dysphagia (14%), and cricopharyngeal muscle dysfunction (11%) in 13% of cases. Furthermore, authors Clav’ e et al.[17] mentioned that, the prevalence of
oropharyngeal functional dysphagia is very high, it affects more than 30% of patients who have had a CVA; 52–82% of patients with Parkinson’s disease; 84% of patients with Alzheimer’s disease, and up to 40% adults aged more than 65 years. The differences between the later study and the present study are that the aim was to detect aspiration of fluids and solid or semi-solid food material into the larynx, however, in the previous study, the most common cause was LPRD. The bedside tests used for swallowing evaluation was WST described by Gordon et al.[18] Coughing during or after completion of swallowing is noted. The presence or absence of post swallow wet-hoarse voice quality was noted. The swallow speed of <10 ml/is scored as abnormal in this study. Whereas Nathadwarawala et al.[19] and Kelly et al.[20] described the standardized bedside swallow assessment wherein the patients are asked to drink 50 ml of water, and the results were reported. In the present study, the four clinical parameters observed during the WST were compared with FEES, namely, choking/cough, change of voice, gag reflex, and pulse oximetry. These parameters represent aspiration of water through the vocal folds. Cough/choking for all test subjects showed a sensitivity of 71.35%, specificity of 69.20%, PPV of 68.50%, and NPV of 72.50%. The sensitivity of change of voice was 76.40%, specificity was 72.50%, PPV was 71.10%, and NPV was 67.30%. The sensitivity of gag reflex was 52.45%, specificity was 55.10%, PPV was 51.75%, and NPV was 50.20%. The sensitivity pulse oximetry was 50.35%, specificity was 47.10%, PPV was 48.25%, and NPV was 53.2%. FEES in the current study FEES was sufficient to detect penetration or aspiration of swallowed materials in the larynx. All the patients examined by FEES tolerated the procedure. None of the patients had any significant complications during or after the procedure. Penetration of laryngeal inlet could be inferred by the presence of colored material after swallowing. These materials touch the superior surface of the vocal folds but not pass below the vocal folds. Aspiration means that the bolus passed the glottis to a level below the vocal folds. The occurrence of aspiration in most patients (75%) who have lost laryngeal sensation reflects the importance of intact laryngeal sensory inputs in the swallowing process. FEES is a valid, effective, low-cost technique that assesses swallowing in a bedside examination. FEES can give information on anatomy, the swallow process, pharyngeal motility, and sensory deficits.[21,22] Although aspiration cannot be seen directly, it can be inferred from residue left after swallowing or ejection of material out of the trachea after coughing.[21] Absent gag reflex was valuable as stated by some authors in assessing aspiration, but it was of less significance to predict aspiration as considered by other authors.[24,25] In the current study, some patients with aspiration detected by FEES had absent gag reflex (40%), moreover, 50% of patients with disturbed laryngeal sensation had absent gag reflex. This might suggest a clinical association between disturbed gag reflexes when the laryngeal sensation is affected, however there is no strong correlation between the coincidences of the two conditions. Gag reflex, when compared with FEES, showed less sensitivity and specificity than other parameters tested. Gag reflex resulted in sensitivity of 52.45%, specificity of 55.10%, PPV of 51.75%, and NPV of 50.20%. These results coincided with those obtained by Davies et al.[26] who demonstrated that up to 30% of healthy younger adults and 44% of healthy older adults may have unilateral or bilateral absent gag reflexes normally. Pulse oximetry provides a noninvasive method of bedside swallow testing. Authors Rogers et al., and Ramsey et al.[27,28] found association between oxygen desaturation secondary to aspiration during oral feeding in neurologically disabled individuals. In this study, most of the patients underwent pulse oximetry during FEES and the results were recorded for 5 min after swallowing. The results showed low sensitivity and specificity in comparison with FEES and with other parameters as choking and dysphonia; sensitivity of 82.15%, specificity of 79.35%, PPV of 80.40%, and NPV of 79.20%. This may be explained by that pulse oximetry in stroke patients might be affected by other factors as central causes of hypoxemia rather than swallowing. However, swallowing difficulties in our patients were caused by different etologies (stroke, RTA, ENT causes, and others).

CONCLUSIONS

Bedside tests can be considered as an important, easy, sensitive, and specific for the detection of aspiration. Combination of choking/cough and change of voice as parameters of aspiration compared with FEES showed high sensitivity and specificity. Further research is needed to establish the most effective combination of bedside tests to detect silent aspiration.

REFERENCES

6. Daniels SK, Ballo LA, Mahoney MC, Foundas AL. Clinical predictors of
Kumar and Prasad: Evaluation of Dysphagia with Bedside Tests and FEES in Aspiration Patients


Medical Students’ Knowledge, Attitude, and Practice toward Scientific Publication in King Faisal University, Kingdom of Saudi Arabia

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Abstract

Introduction: Physicians and medical students have a key role in the progress of scientific publications. Although the research work is mandatory in some medical schools, the number of publications does not meet the number of research.

Aim: In this study, we aim to evaluate the knowledge and attitudes of medical students in our college of medicine toward research and publication.

Materials & Methods: A cross-sectional questionnaire-based study conducted in King Faisal University College of Medicine in Al Hassa Province in Kingdom of Saudi Arabia. The self-administered questionnaire is aimed to assess the attitude and participation of medical students in scientific research and publication and to assess the differences between problem-based learning (PBL) curriculum and traditional curriculum.

Results: In a total sample of 574 medical students, 453 (78.9%) were studying in problem base PBL curriculum and 121 (21.1%) were studying in the traditional curriculum. Regarding the students view about the importance of research publications, 94.4% agreed that it is important to improve career prospects. 359 (62.5%) of the total number of students from both curricula have participated in a scientific research. 27 (4.7%) of the total students have published at least an article. Most of the students agreed that lack of the students (75.8%) agreed that there is lack of training in medical school. Females slightly showed higher participation in research than males, 69.2% compared to 57%.

Conclusion: PBL students scored higher in knowledge, attitude, and practice in regard to scientific publication. However, it was found that there is a significant lack in articles submission and publication among medical students.

Key words: Medical students, Scientific publications, Research, Problem Based Learning (PBL), Medical education

INTRODUCTION

Proficiency in research is an essential competency for a medical student, and part of being an effective researcher involves translating research into scholarship in the form of scientific publications.

Since 2012 King Faisal University has adopted a competency-based and problem-based learning (PBL), curriculum based on the CANMEDs model and research is considered an integral competency of this curriculum. At present, we have two parallel batches in our college - one following a traditional, teacher-centered curriculum, and the other a competency- and problem-based, student-centered curriculum. Starting from the 1st year, medical students in the new problem-based curriculum are required to participate in a mandatory course of medical research under the supervision of professional mentors as a part of the curriculum. There is no formal training related to research in the older traditional curriculum.
This study aimed to evaluate the knowledge and attitudes of medical students in our college of medicine toward research and publication. We also aimed to compare differences between the group in the PBL curriculum and the traditional curriculum.

**METHODOLOGY**

A cross-sectional questionnaire-based study conducted in King Faisal University College of Medicine in AlHassa Province in Kingdom of Saudi Arabia.

**Instrument of Data Collection**

A questionnaire validated by multiple experts and was adapted and distributed among medical students in King Faisal University. The SPSS 20 will be used for the statistical applications and data analysis.

**Target Population**

Medical students in King Faisal University under both PBL curriculum and traditional curriculum were selected.

**Study Outcomes**

The study will assess the attitudes of medical students toward scientific publications, in all academic years among both PBL curriculum students and traditional curriculum students, in both genders. As the PBL curriculum conducts more research sessions with professional mentors, researcher expects to find PBL students more aware and interested in scientific publications. Based on these results, a recommendation to support access to scientific publications and writing of scientific research will be provided.

**RESULTS**

A total sample of 574 medical students, 314 males (54.7%) and 260 females (45.3%), were selected. The study focus on three parameters: Gender, academic year in medical school, and curriculum; PBL; or traditional curriculum. Regarding academic year, 121 students (21.1%) from the 1st year participated in the study, 107 (18.6%) from the 2nd year, 112 (19.5) from the 3rd year, 113 (19.7%) from the 4th year, 62 (10.8%) from the 5th year, and 59 (10.3%) from the 6th year. From 574 students, 453 (78.9%) were studying in PBL curriculum, and 121 (21.1%) were studying in the traditional curriculum. Multiple questions concerning about medical students knowledge and participation in biomedical research and publications were included in the questionnaire. 167 students (29.1%) could define scientific hypothesis correctly, which is a logical deduction of the premises that may or may not be verified empirically. Moreover, 208 (36.2%) could define scientific theory correctly, which is a system of hypotheses logically connected to one another, with common background, some of which have been verified. About 388 (67.6%) of the total sample are reading scientific journals.

About 359 (62.5%) of the total number of students from both curriculum have participated in a scientific research. Moreover, 83 (14.5%) of the total sample have submitted at least an article for publication in scientific journals. 27 (4.7%) of the total students have published at least an article. 434 (75.6%) have been taught how to conduct a research and write an article.

Regarding the students view on the importance of the scientific publication, 542 (94.4%) agree that it is important to improve career prospects. 533 (92.8%) agreed that it is an important skill to learn as a doctor. 536 (93.4%) of the total students agreed that it is important to spread scientific information.

Which of the following are barriers to scientific publication at the undergraduate level, according to you?. A question that was directed to all the students to identify the barriers toward scientific publication. 435 (75.8%) agreed that there is lack of training. 192 (33.4%) had a neutral opinion about lack of incentive as one of the barriers. Regarding lack of good mentors or role models, 135 (23.5%) disagreed. 405 (70.6%) agreed that there is lack of facilities that contributed to the lack of research and publications. For language problems, it has been found that there was a difference in the response of participants as 236 (41.1%) disagreed, 112 (19.5%) neutral, and 226 (39.4%) agreed.

**Gender [Table 1]**

Regarding gender, 57.0% of male students have participated in a scientific research, and 43.0% have not. 69.2% of females have participated in a scientific research, and 30.8% have not [Figure 1].

For males, 80.6% answered with yes about the question. Do you think undergraduate students can plan and conduct a research project and write a scientific paper? 19.4% answered with no. For females, 80.8% answered with yes and 19.2% answered with no.

15.6% of males have submitted at least an article for publication, and 84.4% have not submitted. For females, 13.1% have submitted, and 86.9% have not submitted. 5.7% of males published a scientific article, 94.3% have not published. 3.5% of females have published a scientific article, and 96.5% have not published, which shows that there is a significant lack of article submission and publication among medical students [Figure 2].
Curriculum [Table 2]

About 69.3% of PBL students participated in a scientific research and 30.7% did not participate. 37.2% of students in traditional curriculum participated in a scientific research, and 62.8% did not participate [Figure 1]. 83.2% of students in PBL curriculum answered the question do you think undergraduate students can plan and conduct a research project and write a scientific paper? with yes and 16.8% with no, and on the other hand, 71.1% of students in the traditional curriculum answered with yes and 28.9% with no. This shows that PBL students are exposed more to the research field which reflected on their confidence in conducting a research.

Only 15.3% of PBL students submitted an article for publication. Moreover, 84.7% have not. And 11.6% of traditional curriculum students have submitted and 88.4% have not. Out of these students, only 4.6% of PBL students have published a scientific article, and 95.4% have not published. For traditional students, 5.0% have published, and 95.0% have not published [Figure 2].

As for the training on how to conduct a scientific research, 329 (72.9%) of the PBL curriculum students have been taught how to write an abstract and a paper. Moreover, 104 (86%) from the traditional curriculum have been taught on how to write an abstract and a paper.

Table 1: Gender

<table>
<thead>
<tr>
<th>Question</th>
<th>Chi-square</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you understand the word “impact factor”</td>
<td>4.409*</td>
<td>3</td>
<td>0.221</td>
</tr>
<tr>
<td>Have you ever participated in a scientific research (as part of the research team)?</td>
<td>9.073*</td>
<td>1</td>
<td>0.003</td>
</tr>
<tr>
<td>Do you think undergraduate students can plan and conduct a research project and write a scientific paper?</td>
<td>0.004*</td>
<td>1</td>
<td>0.953</td>
</tr>
<tr>
<td>Do you feel confident in interpreting and writing a research paper and publication?</td>
<td>10.232*</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>Do you read journal articles?</td>
<td>8.477*</td>
<td>1</td>
<td>0.004</td>
</tr>
<tr>
<td>Do you feel you know the process of submitting an article?</td>
<td>4.231*</td>
<td>1</td>
<td>0.04</td>
</tr>
<tr>
<td>Have you ever submitted an article for publication?</td>
<td>0.735*</td>
<td>1</td>
<td>0.391</td>
</tr>
<tr>
<td>Have you published any scientific articles?</td>
<td>1.636*</td>
<td>1</td>
<td>0.201</td>
</tr>
<tr>
<td>Why it is important to you to publish?</td>
<td>5.627*</td>
<td>3</td>
<td>0.131</td>
</tr>
<tr>
<td>To improve career prospects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why it is important to you to publish? Important skill to learn as a doctor</td>
<td>3.486*</td>
<td>3</td>
<td>0.323</td>
</tr>
<tr>
<td>Why it is important to you to publish?</td>
<td>3.979*</td>
<td>3</td>
<td>0.264</td>
</tr>
<tr>
<td>To improve spread of scientific information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of training</td>
<td>13.414*</td>
<td>4</td>
<td>0.009</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of incentive</td>
<td>2.813*</td>
<td>4</td>
<td>0.59</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of good mentors/role models</td>
<td>12.229*</td>
<td>4</td>
<td>0.016</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of facilities</td>
<td>18.684*</td>
<td>4</td>
<td>0.001</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Language problems</td>
<td>2.958*</td>
<td>4</td>
<td>0.565</td>
</tr>
</tbody>
</table>

Table 2: Curriculum

<table>
<thead>
<tr>
<th>Questions</th>
<th>Chi square</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you understand the word ‘Impact factor’</td>
<td>50.231*</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Have you ever participated in a scientific research (as part of the research team)?</td>
<td>42.069*</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Have you ever participated in a scientific research (as part of the research team)?</td>
<td>42.069*</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Have you ever participated in a scientific research (as part of the research team)?</td>
<td>42.069*</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Do you feel confident in interpreting and writing a research paper and publication?</td>
<td>12.935*</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Why it is important to you to publish? Important skill to learn as a doctor</td>
<td>24.844*</td>
<td>3</td>
<td>0.000</td>
</tr>
<tr>
<td>Do you think undergraduate students can plan and conduct a research project and write a scientific paper?</td>
<td>9.035*</td>
<td>1</td>
<td>0.003</td>
</tr>
<tr>
<td>Why it is important to you to publish? Important skill to learn as a doctor</td>
<td>24.844*</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of incentive</td>
<td>44.747*</td>
<td>4</td>
<td>0.000</td>
</tr>
<tr>
<td>Why it is important to you to publish? To improve spread of scientific information</td>
<td>36.756*</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Which of the following are barriers to scientific publication at the undergraduate level, according to you? Lack of facilities</td>
<td>15.391*</td>
<td>4</td>
<td>0.004</td>
</tr>
<tr>
<td>Do you feel confident in interpreting and writing a research paper and publication?</td>
<td>12.935*</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Regarding participation in scientific research, 22.3% from the 1st year students participated in medical research, 67.3% from the 2nd year, 97.3% from a 3rd year, 93.8% from a 4th year, only 22.6% from the 5th year, and 52.5% from the 6th year.

Do you think undergraduate students can plan and conduct a research project and write a scientific paper? 80.2% of 1st year students agreed that an undergraduate student is able to conduct and write a scientific paper, 82.2% from 2nd year, 90.2% from 3rd year, 80.5% from 4th year, 56.5% from 5th year, and 86.4% from 6th year.

Regarding attempt for publication, only 14.5% have submitted a paper for publication, 7.4% of the 1st year students, 5.6% of the 2nd year, 24.1% from the 3rd year, 23.9% from 4th year, 6.5% from fifth, and 16.9% of the 6th year medical students. Only 4.7% have published a scientific paper, 0.8% from 1st year, 0.9% from 2nd year, 7.1% of 3rd year, 9.7% from 4th year, 4.8% of the 5th year, and 5.1% of the 6th year students.

434 students (75.7%) have been taught how to write an abstract and a paper, 53.7% of the 1st year students, 61.7% of the 2nd year students, 88.4% of 3rd year students, 89.3% of the 4th year students, 80.6% of the 5th year, and 91.5% of 6th year students.

**DISCUSSION**

The study focused on the attitude of medical students toward scientific publications, the importance of this study is to assess the attitude toward scientific publications and the barrier preventing medical student from publishing medical articles. Furthermore, comparison between two different learning curricula in terms of research participation to identify the significance of learning modality in the research work and publication.

A study was conducted in the internal medicine department in AlTaif University showed that Saudi Arabia is lagging behind as the 16th among other countries in article publication per one million citizen. In the branch of medicine, 16196 research papers were published in the period 1996–2012. In our study, 27 (4.7%) of the students in King Faisal University have at least one scientific publications, although 83 (14.5%) of the students have submitted an article for publication. Comparing this result with a study conducted in Alfaisal University in Riyadh, seventy-three articles were published in the period between 10 September 2008 and 13 December 2014.

A study was done in Pakistan Medical College of the Aga Khan University, 75 (89.3%) from PBL curriculum and 48 (73.8%) participated in scientific research. Comparison between conventional and PBL curricula in a different scales regarding medical research showed that not only PBL students scored higher in attitude toward health research (75.5% compared to 66.7%) but also they scored higher in the participation scale (89% compared to 74%). In our study at King Faisal University, 314 (69.3%) of PBL students participated in a scientific research while 45 (37.2%) only of students in traditional curriculum participated in a scientific research because in PBL curriculum a mandatory research is required from the students in the 2nd year. In terms of participation, females have participated more in writing research. PBL students are more confident in writing research and publication. Males as well are more confident in their ability to conduct a research paper.

To the best of our knowledge, no data in the literature found to compare attitudes toward research and publication with regard to the type of medical curriculum - PBL versus conventional LBL curriculum. The present study shows...
that the level of publication is similar in both curriculum. 4.6% of PBL students have published a scientific article compared to 5.0% of the traditional curriculum. However, the two selected groups from PBL curriculum and the conventional curriculum were from different years of study. However, the submission of papers to scientific journals was significantly higher in PBL. Comparison between conventional and PBL curricula in a different scales regarding medical research showed that not only PBL students scored higher in attitude toward health research (75.5% compared to 66.7%) but also they scored higher in the participation scale (89% compared to 74%). In Saudi Arabia, a study conducted in King Saud University among one hundred and seventy-two students showed that the majority of the students agreed that research is important in the medical field (97.1%). The majority also agreed that conducting research during medical school is important (87.7%).[^5]

Regarding attitudes and prospects, majority of the students agreed that the most important factor in publication is to improve career prospects. A study was conducted in British medical school regarding publication practice showed similar results that their main goal for publication is career progression.[^6] The results imply that PBL students have more positive attitudes toward research publication. For prospects, four parameters were assessed in the study and PBL students scored higher in all those parameters. Postgraduates who were involved and participating in medical research in medical school have a better attitude and participation scale than others with more negative attitude.[^7]

Most of the students outlined that lack of training is the main barrier for scientific publication. Despite that some studies demonstrate that training on research and abstract writing have a positive outcomes in terms of increasing rate of publication.[^8] Students also stated that lack of facilities, lack of good mentors, lack of incentive, and language problems in this order as other barriers against participating in research and publication

**CONCLUSION**

PBL students scored higher in knowledge, attitude, and practice in regards to scientific publication. However, it was found that there is a significant lack in articles submission and publication among medical students.

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.
A Clinical Study on Active Pulmonary Tuberculosis Using Cancer Antigen-125 as a Diagnostic and Prognostic Tool

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Abstract

Background: Cancer antigen-125 (CA-125) is produced by coelomic epithelium. Its levels are increased in malignant diseases, like ovarian cancer but also in other medical conditions, such as pulmonary and extra-pulmonary tuberculosis (PTB). TB is usually diagnosed using conventional methods such as smear microscopy, culture, and chest radiography. The other methods used are the detection of immunological response and the search for biochemical markers. CA-125 was evaluated mainly in patients with extra-PTB.

Aim of the Study: This study aims to use CA-125 in differentiating PTB from other pulmonary infections; also to determine its value as an indicator of response to antituberculous drugs.

Materials and Methods: Group A consisted of 42 patients with active PTB, Group B consisted of 23 patients with extra-PTB, and Group C consisted of 21 healthy volunteers. CA-125 levels were estimated in all the groups. It was reassayed 4 months after antituberculous medication in Group A.

Observations and Results: The CA-125 values of Group A were higher at significant levels than the other groups. The sensitivity and specificity of CA-125 were found to be 79.34% and 91.30%, respectively, at a 34.6 U/ml cutoff point.

Conclusions: CA-125 was a useful tool in differentiating PTB from extra-PTB. It was also useful in assessing the response to antituberculous drugs in patients.

Key words: Cancer antigen-125, Malignancy and immunological response, Tuberculosis

INTRODUCTION

Even today, tuberculosis (TB) represents an important health problem worldwide that was declared by the World Health Organization to be global emergency,[1] the most common form of clinical form of presentation with TB is pulmonary type. 95% of TB cases reported from developing countries.[2] It is estimated that 12 million patients are coinfected with HIV and mycobacterium TB, with the majority living in Africa and Southeast Asia.[3] Microscopic examination and demonstration of acid-fast stained sputum smears is the most useful diagnostic method.

If it is positive, the initiation of TB therapy and respiratory isolation could be started immediately. However, in few patients, positive acid-fast bacillus in sputum samples may be negative or respiratory specimens may not be available, and other methods have to be used to establish the diagnosis of TB. In addition to microbiological molecular diagnostic tests, certain biochemical parameters are being used as helpful tools for this purpose, including various markers of cellular activity, acute phase reactants, and enzymes.[4-8] Cancer antigen-125 (CA-125) tumor marker also was proposed as a useful diagnostic tool for TB. CA-125 serum concentrations are known to rise in some benign and malignant diseases.[9,10] High serum levels of CA-125 are reported in patients with pulmonary and extra-pulmonary TB (PTB), including pleural, peritoneal, pelvic, miliary, and intra-abdominal TB. However, the diagnostic value of CA-125 to help differentiate PTB from other pulmonary infections has been poorly studied.[11-13] CA-125 antigen or carbohydrate antigen-125 is a high-molecular-weight glycoprotein (200 KDa) which was identified on the surface...
of the ovarian carcinoma cell line OVCA 433 by Bast et al.,\textsuperscript{[14]} in 1981. High levels of CA-125 have been reported in patients with pulmonary and extra-PTB, including pleural, peritoneal, pelvic, miliary, and intra-abdominal disease.\textsuperscript{[11-13]}

The present study was conducted to assess the specificity and accuracy of serum CA-125 levels in differentiating PTB and non-PTB; to use its levels as a prognostic tool to know the effect of antituberculous chemotherapy.

**Institution of Study**
This study was conducted at Kannur Medical College, Anjarakandy, Kannur.

**Period of Study**
This study was from May 2010 to April 2013.

**MATERIALS AND METHODS**

A total of 86 subjects were included in the present study. They were divided as Group A consisted of 42 patients with active PTB, Group B consisted of 23 patients with extra-PTB, and Group C consisted of 21 healthy volunteers. An ethical committee clearance was obtained before commencing the study. An ethical committee cleared consent form was used to collect the data.

**Inclusion Criteria**
1. Patients aged above 18 years were included in all groups
2. Patients with active PTB were included in Group A
3. Patients with non-PTB diseases were included in the Group B
4. Healthy subjects were taken as control
5. Patients with typical symptoms of TB such as cough, expectoration, fever, chills, evening rise in temperature, night sweating, loss of weight, and appetite were included.

**Exclusion Criteria**
1. Patients non-TB lung diseases were excluded.
2. Patients with acute pyrexia of unknown origin were excluded.
3. Patients with COPD were excluded.
4. Patients with rheumatic fever or carditis were excluded.
5. Patients with malignancies, cirrhosis of liver, renal diseases, and gynecological tumors were excluded.
6. Patients with heart failure (left-sided heart failure) were excluded.

All the patients in Group A (42 patients) were elicited about their illness and symptoms of TB. All the patients were subjected to TC, DC, ESR, and Mantoux test, sputum for AFB, X-ray chest, and serum CA-125 levels. All patients in Group A received antituberculous drugs in the form of 2 months of intensive therapy of rifampicin, isoniazid, pyrazinamide, and ethambutol followed by 4 months of rifampicin and isoniazid. After 2 months of treatment, sputum smears were repeated and conversion into sputum smear-negative occurred in all patients. Radiological signs of PTB were noted in the data. In Group B, patients (23 patients) with non-PTB were included. Patients in this group were those who had tuberculous lymphadenitis, TB osteomyelitis, and renal TB and dermatological TB diseases. All the patients in this group were negative for sputum AFB staining. All patients in Group A received antituberculous drugs in the form of 2 months of intensive therapy of rifampicin, isoniazid, pyrazinamide, and ethambutol followed by 4 months of rifampicin and isoniazid. After 2 months of treatment, serum CA-125 levels were estimated. Group C subjects were healthy individuals without respiratory symptoms or TB symptoms. They also were subjected to all the tests on special consent. 5 ml of venous blood was drawn from each subject. Blood samples were left to clot for 15–20 min at 37°C, and then centrifuged at 3000 rpm for 20 min. Expressed serum was frozen at 40°C till the time of CA-125 assay. The results were automatically calculated by the instruments and the concentrations were expressed in U/ml. Another assessment of serum CA-125 was detected among Group (A) after 4 months of antituberculous drugs. All the data collected were analyzed using standard statistical methods; \( P < 0.05 \) was taken as significant.

**OBSERVATIONS AND RESULTS**

In the Group A 42 patients, there were 28 males and 14 female patients. The age group was between 20 and 60 years with a mean age of 38.42 ± 2.68 years. In the Group B 23 patients, there were 15 males and 08 female patients. The age group was between 20 and 60 years with a mean age of 36.35 ± 3.47 years. In the Group C 21 patients, there were 11 males and 10 female patients. The age group was between 20 and 60 years with a mean age of 39.10 ± 2.68 years [Table 1]. The data are not significant in regards with the formation of groups \((P = 0.601)\) but significant in regards with the mean age \((P = 0.041)\), [Table 1].

The mean CA-125 levels in Group A were 91.6 U/ml, in Group B, it was 61.4 U/ml, and in Group C, it was 12.6 U/ml. The CA-125 levels were significant.

**Table 1: The gender incidence and age incidence \((n=A-42, B-23, C-21)\)**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>28</td>
<td>14</td>
<td>11</td>
<td>0.601</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>08</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mean age</td>
<td>38.42±2.68</td>
<td>36.35±3.47</td>
<td>39.10±2.68</td>
<td>0.041</td>
</tr>
</tbody>
</table>

CA-125: Cancer antigen-125
Higher among Group A compared to normal subjects in Group C ($P = 0.006$) [Table 2]. The CA-125 values are compared between Groups B and C and found to be significant ($P = 0.028$). Similarly, the CA-125 values compared between A and B groups were not significant ($P = 0.061$) ($P < 0.05$).

Serum CA-125 levels were reasayed after 4 months of antituberculous treatment among Groups A and B patients. CA-125 levels were significantly lower after treatment than before in Group A patients; it was 32.7 U/ml, and in Group B, it was 27.4 U/ml with $P = 0.008$ [Table 3].

The radiological signs before and after treatment in Group A patients were correlated with the C-125 levels and found that there was statistical significance with $P = 0.042$ [Table 4].

The sensitivity and specificity of CA-125 values in the diagnosis and as a tool of prognostic assessor in the study were calculated from the data and found to be 81.4% and 95%, respectively.

**DISCUSSION**

CA-125 levels in the serum as a tumor marker although used in the diagnosis and assessing the prognosis of ovarian and other malignant tumors in the literature, later, it was found to be useful in diagnosing the benign conditions also. It was studied in the diagnosis and assessing the prognosis of ovarian and other malignant tumors in the literature, later, it was found to be useful in diagnosing the benign conditions also. It was studied in the literature that serum CA-125 levels were higher than normal in patients with pulmonary and extra-PTB and that serum CA-125 level may be a useful marker for discriminating between patients with active TB and those with inactive disease.$^{[13,15]}$ In the present study, serum CA-125 levels were significantly higher in Group A patients with active PTB when compared to healthy subjects as well as Group B patients with non-PTB and healthy subjects of Group C [Table 2]. The mean CA-125 values in a study by Yilmaz et al.$^{[13]}$ among patients with PTB were ([109.7] 86.9 U/ml), while it was ([118.46] 248.41 U/ml) in Ozsahin et al. study,$^{[14]}$ which are closer to the values in the present study (91.6 U/ml). On the other hand, Kim et al. study$^{[17]}$ showed a lower mean value of CA-125 in patients with active PTB ([54.5] 22.4). The difference may be due to the different methods of diagnosis used for tuberculosis; they depended on sputum culture while in this study sputum examination of acid-fast bacillus was used. The authors Ronay et al.$^{[19]}$ determined that CA-125 was immunohistochemically localized and sharply demarcated around tubercular granuloma with peritoneal TB; they concluded that the inflammatory mesothelial cell proliferation was the source for secretion of CA-125 in patients with TB. In the present study, there was a significant positive correlation between serum CA-125 levels and incidence of positive radiological signs of PTB [Table 4]. Similar results are in agreement with those reported by Kanagarajan et al.$^{[19]}$ who found that levels of CA-125 being highest in cavity PTB and in miliary TB. Kim et al.$^{[17]}$ also found that CA-125 levels appeared to be highest in patients with cavitary rather than nodular type and this may reflect the level or extent of the infection. In the present study, there was an insignificant correlation of age and sex to CA-125 among the entire studied Table 1. The sensitivity and specificity of CA-125 values in the diagnosis and as a tool of prognostic assessor in the study were calculated from the data and found to be 81.4% and 95%, respectively.

**REFERENCES**

Rajasekhar: Cancer Antigen-125 As A Diagnostic And Prognostic Tool In Pulmonary Tuberculosis

7. Taha RA, Kotsimbos TC, Song YL, Menzies D, Hamid Q. IFN-gamma and IL-12 are increased in active compared with inactive tuberculosis. Am J Respir Crit Care Med 1997;155:1135-9.

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A Clinical Study of Left Ventricular Function in Patients with Chronic Obstructive Pulmonary Disease

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) patients usually present with the right ventricular hypertrophy and eventual right side heart failure. Sometimes, disturbance in the left ventricular (LV) function is also observed in COPD patients. The prevalence of the LV diastolic dysfunction in COPD patients using echocardiography parameters varies widely in the literature.

Aim of the Study: This study aims to evaluate the LV function in patients with COPD with or without pulmonary hypertension (PH).

Materials and Methods: A total of 66 patients with COPD without additional cardiac diseases were grouped as “A” and 22 healthy individuals who were matching with sex and age of Group A were named as Group “B.” Spirometry, standard, and tissue Doppler echocardiography were performed in both groups. The results obtained were analyzed.

Observations and Results: Among Group A, 36 had PH. The LV systolic function was similar in both the groups. The LV diastolic function and LV function by myocardial performance index (MPI) were significantly different in different grades of COPD. Patients with COPD and hypertension had significantly higher heart rate, less E-wave peak velocity (measured by DTI) (P < 0.05), less E/A ratio (measured by DTI) (P < 0.01) and E/A ratio (measured by flow), and higher MPI (P < 0.05) than normal pulmonary pressure patients.

Conclusion: In patients with progressive COPD, there was the effect on LV diastolic function and LV function by MPI, especially those with PH.

Key words: COPD, Diastolic dysfunction and spirometry, Left ventricular function

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is basically a disease of airflow obstruction resulting in permanent changes in the lungs over a period of time. This results in extra-pulmonary pathophysiological changes in the cardiovascular system and is associated with important comorbidities that may contribute to the disease severity.

The airflow obstruction in the lungs is due to an abnormal inflammatory response of the lungs to noxious particles or gases, particularly cigarette smoke.[1] The main causes of morbidity and mortality among COPD patients are cardiovascular disease (CVD) and lung cancer.[2-4] COPD is a major cause of chronic morbidity and mortality throughout the world. COPD is the fourth leading cause of death in the world[5] and further increases in its prevalence and mortality can be predicted in the future time.[6] Among COPD patients, CVD is responsible for approximately 50% of all hospitalizations and 20% of all deaths.[7] Demographic studies have shown that regardless of smoking status, age, or sex, a COPD diagnosis increases the risk of cardiovascular morbidity and mortality by approximately two-fold.[8] The most important complication of COPD is pulmonary hypertension (PH) which can change the natural history of
COPD and is associated with reduced survival and greater use of health-care resources. Cor pulmonale may develop in patients with COPD and is characterized by elevated pulmonary vascular resistance and right heart failure, with associated reductions in left ventricular (LV) filling, LV stroke volume, and cardiac output, although LV ejection fraction is generally preserved. In this context, the present study was conducted to evaluate the LV function in patients with COPD with or without PH.

**Institution of Study**
This study was conducted at Kannur Medical College, Anjarakandy, Kannur.

**Period of Study**
This study was from March 2011 to February 2014.

**MATERIALS AND METHODS**

66 patients with diagnosis of COPD were included as Group A and 22 normal subjects are included as Group B as a control group in the present study.

**Inclusion Criteria**
1. Patients aged above 45 years and below 70 years were included.

**Exclusion Criteria**
1. Patients with pulmonary diseases such as pulmonary tuberculosis, bronchiectasis, and interstitial pulmonary disease, were excluded.
2. Patients with unstable cardiorespiratory status; the occurrence of respiratory failure, bronchopulmonary infection, or congestive heart failure in the previous 2 months were excluded.
3. Patients with structural diseases of the heart (valvular heart disease, congenital heart disease, and cardiomyopathy) were excluded.
4. Patients with a history of ischemic heart disease defined as typical angina pectoris, prior myocardial infarction, positive exercise test result, positive myocardial scintigraphy, or positive coronary angiography findings were excluded.

An ethical committee clearance was obtained from the institute. An ethical committee approved consent form was used to collect the data. A thorough clinical history was taken about both respiratory and cardiac symptoms in the two group subjects. All the subjects were performed a resting ECG tracing, systolic and diastolic blood pressure measurement, echocardiography, and resting spirometry. Echocardiography was performed in all patients; (A) conventional echocardiography; (i) Measurement of LV EF%, (ii) LV diastolic filling patterns, (iii) the diastolic parameters were measured from at least 3 beats and were defined as follows: E-wave, early maximal transmitral flow velocity; A-wave, peak velocity during atrial contraction in late diastole; and ratio between the early peak transmitral flow velocity (E) and late peak atrial systolic velocity (A) [E/A ratio], and (iv) the right ventricular (RV) systolic pressure was obtained from the velocity of tricuspid regurgitation (tricuspid regurgitation velocity ≥2.9 m/s), (B) pulsed wave DTI: (i) Isovolumetric contraction time, (ii) isovolumetric relaxation time (IVRT), (iii) S-wave duration (ejection time), and (iv) the regional myocardial velocity waves were systolic velocity (S-wave; cm/s), peak early diastolic filling velocity (Em; cm/s) and peak late diastolic filling velocity (Am; cm/s), also Em/Am ratio and Eflow/Em were calculated. Myocardial performance index (MPI) was calculated by the sum of isovolumic contraction time and relaxation time divided by ejection time. Mean MPI value was calculated, and (C) spirometry was done in all the subjects assuming that patients were diagnosed to have COPD if they had FEV1/FVC ratio <0.70. All the patients were classified into four groups as follows:

- Stage I (mild): Post-bronchodilator FEV1 ≥ 80% predicted
- Stage II (moderate): 50%≤ post-bronchodilator FEV1 <80% predicted
- Stage III (severe): 30%≤ post-bronchodilator FEV1 <50% predicted
- Stage IV (very severe): Post-bronchodilator FEV1 <30% predicted or <50% predicted plus chronic respiratory failure.

All data were presented as mean ± SD unless otherwise stated. Comparisons were performed by unpaired t-tests for quantitative data. For qualitative data, v2 was used. P < 0.05 was used to indicate differences between the groups that were statistically significant.

**OBSERVATIONS AND RESULTS**

In Group A, among the 66 patients, males were 51 (77.27%) and females were 15 (22.72%). In Group B, there were 22 patients; males were 11 (50%) and females were 1 (50%). The mean age of Group A was included patients was 58.25 ± 3.60 and Group B was 53.74 ± 2.80. There was a statistical significance among the subjects selected in the study in both the groups in regard with gender and mean age (P < 0.05) [Table 1].

In Group A, 36 patients had PH and 30 had no PH (45.45%). Assessing the LV systolic function showed the mean ejection fraction in Group A was 63.26 ± 21, and in Group B, it was 62.86 ± 10. The S-wave peak velocity
TABLE 1: The gender incidence and age distribution in the study groups (A: n=66), (B: n=22)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A-66</th>
<th>Group B-22</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (%)</td>
<td>51–77.27</td>
<td>11–50</td>
<td>0.028</td>
</tr>
<tr>
<td>Female (%)</td>
<td>15–22.72</td>
<td>11–50</td>
<td>0.028</td>
</tr>
<tr>
<td>Mean age</td>
<td>58.25±3.60</td>
<td>53.74±2.80</td>
<td>0.034</td>
</tr>
</tbody>
</table>

Table 2: The echocardiogram findings in both the Groups (A: n=66), (B: n=22)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Group A</th>
<th>Group B</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate (mean±SD)</td>
<td>89.15±8.35</td>
<td>82.93±7.28</td>
<td>0.011</td>
</tr>
<tr>
<td>PH</td>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>36 (54.54%)</td>
<td>00 (0)</td>
<td>0.015</td>
</tr>
<tr>
<td>Absent</td>
<td>30 (45.45%)</td>
<td>22 (100)</td>
<td></td>
</tr>
<tr>
<td>LV systolic function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ejection fraction (mean %±SD)</td>
<td>63.26±21</td>
<td>62.86±2.10</td>
<td>0.046</td>
</tr>
<tr>
<td>S-wave peak velocity (mean %±SD)</td>
<td>08.60±1.01</td>
<td>09.15±0.42</td>
<td></td>
</tr>
<tr>
<td>LV diastolic function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-wave peak velocity by mitral flow (Eflow) (m/s) (mean±SD)</td>
<td>0.51±0.11</td>
<td>00.62±0.18</td>
<td>0.039</td>
</tr>
<tr>
<td>E/A by flow (mean±SD)</td>
<td>0.90±0.13</td>
<td>01.10±0.04</td>
<td>0.036</td>
</tr>
<tr>
<td>E-wave peak velocity by DTI (Em) (cm/s) (mean±SD)</td>
<td>07.89±1.42</td>
<td>11.65±1.73</td>
<td>0.042</td>
</tr>
<tr>
<td>Em/Am by DTI (mean±SD)</td>
<td>00.72±0.09</td>
<td>01.32±0.41</td>
<td>0.041</td>
</tr>
<tr>
<td>Eflow/Em (mean±SD)</td>
<td>06.15±0.74</td>
<td>05.02±0.75</td>
<td>0.393</td>
</tr>
<tr>
<td>IVRT (msec.) (mean±SD)</td>
<td>73.62±4.12</td>
<td>56.70±2.80</td>
<td>0.050</td>
</tr>
<tr>
<td>Left ventricular function</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MPI (mean±SD)</td>
<td>0.063±0.03</td>
<td>59.30±1.85</td>
<td>0.021</td>
</tr>
</tbody>
</table>

PH: Pulmonary hypertension, LV: Left ventricular, IVRT: Isovolumetric relaxation time

in Group A was 8.60 ± 1.01 and, in Group B, it was 09.15 ± 0.42 [Table 2]. Similarly, the LV diastolic function values were shown in Table 2. Statistically, when the values of the two groups were compared, they were found to be significant with P value below 0.05 [Table 2].

The distribution of the patients of Group A among the four grades of COPD observed was tabulated in Table 3.

**DISCUSSION**

In the present study, 36 COPD patients (54.545.6%) had PH with a highly statistically significant difference between patient and control groups. PH is the most common complication observed in patients with advanced COPD. It has clear effects on both morbidity and mortality. The actual incidence of PH in COPD is not available in the literature, but an elevation of pulmonary arterial pressure is reported to occur in 20–90% of patients when measured by right heart catheterization with some evidence that pulmonary hemodynamics worsen with worsening airflow obstruction. The heart rates were compared between the Groups A and B subject’s and found that there was a highly statistically significant difference in heart rate between patient and control groups, it also increased significantly with increasing the severity of COPD and in COPD patients with PH. This may be due to hypoxia and hypercapnia working as stimulants to the sympathetic system. The frequent association of autonomic neuropathy in COPD, as the parasympathetic activity was found to be significantly reduced in COPD, while there was sympathetic excitation, and finally, as a side effect to the COPD medications as bronchodilators. The present study showed non-significant difference between patient and control groups in regard with echocardiography assessment of LV systolic function (ejection fraction and S-wave peak velocity). However, the difference between both groups was significant regarding LV diastolic function (E-wave peak velocity by mitral flow, E-wave peak velocity by DTI, Eflow/Em ratio, Em/Am ratio by DTI, Eflow/Aflow ratio by flow, and IVRT) and LV function by MPI [Table 2]. An increase in RV afterload is common in COPD patients. An increase in RV afterload induces an LV diastolic dysfunction (LVDD) due to biventricular interdependence. Transthoracic echocardiography can estimate LV diastolic function using early (E) and late (A) peak diastolic velocities measured with Doppler transmitral flow, and tissue Doppler imaging of mitral annulus velocities including early (Ea) peak diastolic velocity. In their study Lamia et al. excluded patients with an LV systolic dysfunction or any other reason of LVDD. They found that the E-wave was significantly lower and the A-wave was significantly higher in COPD patients compared to control subjects. The E/A ratio was significantly lower in COPD patients as well as the Ea velocity and the E/Ea ratio which were significantly higher in COPD patients, indicating an LVDD. They also concluded that LVDD does exist in COPD patients with increased RV afterload and no pre-existing LV dysfunction. The present study observed that the difference between the four grades of COPD as regarding age and gender was statistically non-significant [Table 3]. In this study of COPD patients, 9 mild (25%), 12 moderate (33.33%), 7 severe (19.44%), and 8 very severe (22.22%) COPD patients had PH. The difference between mild and very severe COPD was highly significant with P = 0.031 and between mild versus severe and moderate versus very severe COPD patients was significant (P < 0.05). In a similar study by Gupta et al., the frequencies of PH in mild, moderate, severe, and very severe COPD were 16.67%, 54.55%, 60.00%, and 83.33%, respectively. Although the effects of COPD and emphysema on the heart were well recognized, they were studied principally in very severe COPD only. Clinical data on PH in milder COPD are limited due to the invasive procedure required, that is, right heart catheterization. In certain studies of mild-to-moderate COPD patients in who right heart catheterization was used, showed increases in pulmonary artery pressure with exercise. In the present study, LV systolic function was not significantly affected between different COPD grades, whereas the LV diastolic function values showed a statistically significant difference. In another study by Funk...
et al.\(^{[21]}\) observed that LVDD in COPD patients with normal pulmonary arterial pressure and it increased with RV afterload. Present study showed in echocardiography findings of COPD with hypertension had significantly higher heart rate, less E-wave peak velocity (measured by DTI) than normal pulmonary pressure patients. Kasnet et al.\(^{[20]}\) studying LVDD in patients with idiopathic PH using invasive pressure-volume loop analysis and observed that LV dysfunction was present even in the absence of intrinsic LV disease. Bhargava and Sunnerhagen\(^{[23]}\) found early diastolic LV regional wall asynchrony in their patients with PH. They explained that it was due to the interventricular interaction caused by pressure gradients across the septum. Similar to this study, the relation between RV pressure and LVDD in a large group of cor pulmonale patients of different etiology (including COPD patients), was confirmed by Martnez et al.\(^{[24]}\)

**CONCLUSIONS**

LV diastolic function and LV function by MPI are affected in COPD patients, especially with progression of the disease. COPD patients with PH are more liable to LV diastolic and LV dysfunction by MPI than normal pulmonary pressure COPD patients. Doppler tissue echocardiography is a better tool in the assessment of LV function.

**REFERENCES**

Bacterial and Fungal Profile of Infectious Keratitis: A Prospective Study

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Abstract
Background: Keratitis is the term applied for inflammations of the cornea. Microbial keratitis is a common, potentially vision-threatening ocular infection that may be caused by bacteria, fungi, viruses, or parasites. The purpose of the present study is to determine microbial etiology of suppurative keratitis and to identify the risk factors predisposing to corneal infections.

Materials and Methods: Fifty patients attending ophthalmology outpatient department and diagnosed with corneal ulcer needing microbiological investigations were included and subjected to microbiological intervention. All patients were subjected to slit-lamp biomicroscopic examination. After detailed ocular examination, corneal scrapings were collected under aseptic conditions. All laboratory methods followed standard protocols and microbial cultures were considered positive only if they fulfil the criteria.

Results: Corneal stains were found to be positive in 38 (76%) patients. Corneal cultures were found to be positive in 36 (72%) patients. 18 (36%) patients had bacterial growth, 18 (36%) had fungal growth, and the remaining 14 (28%) were found to be culture negative. That is, the bacterial and fungal infections occurred almost with equal frequency. The predominant bacterial pathogen isolated was *Streptococcus Pneumoniae* representing 16% followed by *Pseudomonas* 8%. The predominant fungal pathogens isolated were *Aspergillus* species (24%) followed by *Candida Albicans* (8%). The sensitivity of potassium hydroxide staining was almost 100% in culture-proven fungal cases. Trauma is the leading cause for the corneal ulcers, and most of the fungal ulcers are because of trauma due to vegetative matter.

Conclusion: Staining efficiently establishes the diagnosis, and therefore, can be used in the management of corneal ulcer to start the prompt treatment as corneal ulcer is a medical emergency. The microbiological profile helps the ophthalmologists to start the specific treatment directed against the causative organisms.

Key words: Bacteria, Fungus, Infectious keratitis

INTRODUCTION

Keratitis is the term applied for inflammations of the cornea. Corneal infections are known to be the second most significant cause of monocular blindness rated after unoperated cataract in some developing nations in particular and in the tropics in general. Microbial keratitis is a common, potentially vision-threatening ocular infection that may be caused by bacteria, fungi, viruses, or parasites. Emphasizing the importance of corneal ulceration as an important cause of visual loss, many studies have reported the prevalence of microbial pathogens and identified the risk factors predisposing a population to corneal infection in India and abroad.[¹]

The etiological and epidemiological patterns of corneal ulceration have been found to vary with the patient population, health of the cornea, geographic location, and climate and also tend to vary over time. Hence, an understanding of the epidemiological features, risk factors, and etiological agents that occur in a specific region is important in rapid recognition, timely institution of therapy, optimal management, and prevention of this disease. To start specific therapy, it is necessary to do meticulous laboratory investigations, and this includes microscopy and culture of corneal scrapings for identification of the microbial agent.[²]
Sedhu, et al.: Bacterial and Fungal Profile of Infectious Keratitis

More than one-third of eye injuries among children and adolescents result from their natural curiosity, immature motor skills, and tendency to imitate adult behavior without assessing the risks relevant to their actions. Although infectious keratitis is not common in this age group, it is potentially devastating as approximately considering that 30% of young victims of serious eye injuries end up with visual acuity lower than 20/200. Infectious keratitis is more prevalent in tropical developing countries with poor healthcare systems than in developed countries.[3]

The diagnosis of keratitis is usually clinical, and the treatment is empirical, with the application of broad-spectrum topical antimicrobial agents until identification of the etiologic agent is completed. However, few studies have investigated the causative agents and risk factors of infectious keratitis in children and adolescents.[4,5]

There are several preceding studies establishing the microbial etiology of suppurative keratitis from various parts of the world.[6-9] However, little data are found in the technical literature from India in particular. Since microbial etiology varies geographically, the present study acquires significance on the backdrop of similar articles for other regions of India. The purpose of the present study is to determine microbial etiology of suppurative keratitis and to identify the risk factors predisposing to corneal infections.

MATERIALS AND METHODS

Fifty patients attending the ophthalmology outpatient department and diagnosed with corneal ulcer needing microbiological investigations with their consents were included and subjected to microbiological intervention.

Inclusion Criteria
All patients with presumed infection corneal ulcer attending ophthalmology department for 1 year were included in the study.

Exclusion Criteria
The following criteria were excluded from the study:
1. The patients who are not willing to give consent for investigations.
2. The patients with corneal ulcer involving peripheral cornea.

Method of Collection of Data
After a detailed history and thorough clinical examination, the patient was subjected to a protocol of investigations. Routine investigations such as hemogram and renal blood sugar were done. Briefly, all patients were subjected to slit-lamp biomicroscopic examination. After detailed ocular examination, corneal scrapings were collected under aseptic conditions from each ulcer after instillation of 4% lignocaine (lidocaine) without preservative using a sterile blade (no 15) or hypodermic needle. The procedure was performed under magnification of slit-lamp or operating microscope. The scraped tissue obtained from leading edge and base of each ulcer is directly surfaced on solid media such as Sheep blood agar, chocolate agar, and Sabouraud dextrose agar in a row of C-shaped streaks. The material obtained by the next scraping was spread onto labeled slides in a thin, even manner for 10% potassium hydroxide (KOH) wet mount, gram staining, Giemsa staining. When KOH smears were positive for Acanthamoeba cysts, corneal scrapings were taken and the material was inoculated on non-nutrient agar. Meticulous care was taken in the collection of material and transferring it to the appropriate culture media aseptically.

Procedure
All inoculated media was incubated aerobically. The inoculated media - blood agar, chocolate agar, tryptone glucose beef extract agar, brain heart infusion agar, was incubated at 37°C and was evaluated at 24 h and 48 h and later discarded if there was no growth. The inoculated fungal media Sabouraud’s dextrose agar was incubated at 27°C, examined daily, and discarded at 3 weeks if no growth was seen. The inoculated non-nutrient agar (Escherichia coli enriched) was examined for the presence of Acanthamoeba and discarded at 24 h if there was no growth. All laboratory methods followed standard protocols, and microbial cultures were considered positive only if one of the following criteria was fulfilled.
1. The growth of the same organism demonstrated on two or more solid media on the C- streak; or semi confluent growth at the site of inoculation on one solid medium.
2. Is consistent with clinical signs.
3. Smear results consistent with cultures.

RESULTS

A total of 50 patients with the clinical diagnosis of infectious keratitis were enrolled for this study. Epidemiological characteristics of the population are recorded. A maximum of patients were from the age group 21–40 years followed by patients in the age-group 41–60 years. Male predominance is noticed. About 70% patients hailed from urban areas. The occupation profile of the study group mainly consisted of housewives (21%), followed by farmers (16.9%), laborers (13.6%), and carpenters (12.3%).

All inoculated media was incubated aerobically. Different media showed different percent of growth [Tables 1-6]. Corneal stains were found to be positive in 38 (76%) patients.
The predominant bacterial pathogen isolated was *Streptococcus Pneumoniae* representing 16% followed by *Pseudomonas* 8%. The predominant fungal pathogens isolated were *Aspergillus* species (24%) followed by *Candida Albicans* (8%). Of this, 18 (36%) patients had bacterial growth, 18 (36%) had fungal growth, and the remaining 14 (28%) were found to be culture negative. That is, the bacterial and fungal infections occurred almost with equal frequency [Tables 7-10].

Trauma is the leading cause for the corneal ulcers, and most of the fungal ulcers are because of trauma due to vegetative matter [Table 11]. The incidence of the bacterial and fungal keratitis is almost the same in this area. The higher incidence of fungal ulcers may be related to the agricultural activities and the environmental conditions.

### DISCUSSION

Considering the predominant predisposing factor of trauma in all types of microbial keratitis (bacterial - 46.6%, fungal - 81.9%, and *Acanthamoeba* - 95.5%), the probable reason for male preponderance is obvious. Ocular trauma was significantly more associated with outdoor occupation in this series.
It is interesting to note that a majority of our patients presented within 1 week of onset of symptoms. This indicates the easy availability of transport to patients and is in contrast to the situation in other developing countries such as Nepal where 19.3% of the patients took longer than 1 month to reach the hospital for treatment.\(^{[10]}\)

Direct microscopic examination of corneal scrapings provides rapid diagnosis and forms the basis for instituting initial antimicrobial therapy which may be modified later according to culture reports.\(^{[11]}\) The detection of fungi was much higher in the smears than it was for bacteria in our study.

In the study conducted by different researchers\(^{[12-15]}\) regarding the utility of Gram-stain in the diagnosis of early and advanced bacterial keratitis, the sensitivity was found to be 36.0% and 40.0% respectively. The low sensitivity was attributed to the use of antibiotics prior to presentation by nearly 50% of the patients. The sensitivity of Gram’s stain in the diagnosis of bacterial keratitis, as reported by other authors, is close to the overall sensitivity noted in their study (56.6%) which dropped on the correlation of the presence of similar bacteria in smears and cultures (45.7%).

Microorganisms were isolated in 72% of the cases. This figure is close to many other reports but is almost near to the reports from Nepal (80%) and from Bangladesh (81.7%).\(^{[16,17]}\) The protocol of culture techniques followed in this study and the procedure of sample inoculation directly in the clinic leave virtually no scope for the role of laboratory-related reasons for low yield in culture.

A majority of our patients had a corneal infection by a single agent, the most common being bacterial of which \textit{S. Pneumoniae} was found to be most predominant organism followed by \textit{Pseudomonas}, which is very much similar to other studies from Asia and Africa.\(^{[18,19]}\)

A review of literature of most of the studies from developed countries such as the USA (except southern USA) and Australia showed \textit{Staphylococcus Epidermidis} or coagulase-negative staphylococci as the leading cause of bacterial keratitis.\(^{[20]}\) It is not clear whether the tendency to consider \textit{S. Epidermidis} or coagulase-negative staphylococci as a normal commensal of the conjunctiva may have led to underreporting in some of the studies.

A high prevalence of fungal keratitis caused by filamentous fungi in warmer climates has been widely reported.\(^{[20,21]}\) The most common fungi isolated were \textit{Aspergillus} followed by candida. Similar reported incidence in other regions of India is 7.3% in North India, 32% in East India, and 38.9% in West India. This regional variation could be because fungal keratitis is expected to be more common in the tropical and subtropical regions than in the temperate regions. This is in contrast to most reports of \textit{Aspergillus} from India and Candida in other parts of the world.

The diatomaceous fungi are frequently reported as causes of keratitis in many tropical and subtropical regions.\(^{[22]}\) In similar studies in South India, the incidence of fungal keratitis was nearly 38%.\(^{[23]}\)

This study was developed primarily to determine the specific pathogens responsible for corneal ulceration, and an attempt was made to identify the epidemiological characteristics of the population at risk for corneal ulceration as well as those factors which predispose to the development of a corneal ulcer.

Comprehensive surveys such as this are necessary to assess the specific epidemiological characteristics of corneal ulceration which are unique for each region and population, to design an efficient public health program for the rapid referral, diagnosis, treatment, and ultimately the prevention of corneal ulceration in the population at risk.\(^{[24]}\)

The present study was limited by the small sample size and a relatively short period of study. Further, detailed analysis is needed over a longer duration of time making use of modern investigative modalities such as immunochrometry, fluorescent microscopy, enzyme immunoassays, radiolmmunoassays, and molecular biological techniques which have led to the modification of the conventional techniques, for rapid identification of the various etiological agents of ocular infections within 1–6 h. This will help us in further consolidating the findings of our study and help us in identifying the pathogen and institute prompt treatment.

**CONCLUSION**

1. Corneal stains were found to be positive in 38 (76%) patients.
2. Corneal cultures were found to be positive in 36 (72%) patients. Of this, 18 (36%) patients had bacterial growth, 18 (36%) had fungal growth, and the remaining 14 (28%) were found to be culture negative. That is, the bacterial and fungal infections occurred almost with equal frequency.
3. The predominant bacterial pathogen isolated was \textit{S. Pneumonia} representing 16% followed by \textit{Pseudomonas} 8%.
4. The predominant fungal pathogens isolated were \textit{Aspergillus} species (24%) followed by \textit{C. Albicans} (8%).
5. The sensitivity of KOH staining was almost 100% in culture-proven fungal cases.
6. Trauma is the leading cause for the corneal ulcers, and most of the fungal ulcers are because of trauma due to vegetative matter.
7. The incidence of the bacterial and fungal keratitis is almost the same in this area. The higher incidence of fungal ulcers may be related to the agricultural activities and the environmental conditions.
8. Staining efficiently establishes the diagnosis therefore it can be used in the management of corneal ulcer to start the prompt treatment as corneal ulcer is a medical emergency.
9. The microbiological profile helps the ophthalmologists to start the specific treatment directed against the causative organisms.

REFERENCES


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Segregation in Serious Cases of Perforative Peritonitis

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Abstract

Background: Emergencies like perforative peritonitis present in various clinical forms ranging from early presentation to presentation in septic shock state. An indigenous system based on important clinical parameters, hematology and biochemical profile of patients which can help in segregating serious cases which in turn can be referred to still higher centers should be devised. Chest and cardiac evaluation have been given veto powers. This means that even if other criteria suggest that patient should be taken in and chest/cardiac evaluation shows high risk, the case is referred to higher center. The objective criteria are in evolving stage and brought to readership through this article for further improvement based on individual’s experience.

Aims: To use an objective criteria or algorithm which could help in segregating and selecting right cases of abdominal emergencies particularly perforating peritonitis so that mortality is avoided by taking up a wrong case (which cannot be treated at such a under resourced centre).

Materials and Methods: Although there are several scoring systems available for severe peritonitis, but over last 10 years 256 cases of perforation peritonitis coming to SGT Medical College, Budhera, Gurugram, Haryana, formed the material of study. All patients were screened through following parameters e.g. age, de-hydration, pulse/b.p., urine output, haemoglobin, S. albumin, blood urea, S. creatinine, S. sodium, S. potassium. Based on these parameters patients were divided into category I and II. Category I patients were retained for further management at the peripheral centers while Category II patients were subjected to resuscitation by intravenous fluids, blood, antibiotics etc. for 4 h. All the parameters as above were again evaluated after 4 h and if the patient moved to category I it was retained for further management otherwise it was referred to a tertiary care centre.

Result: After applying all these criteria, initially 190 patients were found to belong to category I while 66 to category II [Table 1]. These 66 patients were subjected to intensive resuscitation and monitoring and reevaluation was done after 4 h. As a result of resuscitation 13 patients had climbed to category I while 53 still remained in category II All these 53 patients were referred to still higher centre. All the 203 patients who were taken were subjected to exploratory laparotomy where relevant pathology was appropriately dealt i.e. closure of duodenal perforation or enteric perforation etc. Thus we see that majority of the patients had duodenal perforation and enteric perforations. There were 2 patients having uterine perforations. In the present series the mortality is nil because of selection criteria of taking in the patient in a peripheral under resourced centre. Superficial wound dehiscence and stitch sepsis were the most common complications in the present series.

Conclusion: By applying objective criteria for segregating serious illnesses requiring surgical intervention e.g. perforative peritonitis, it would be a good idea to segregate more serious cases right at the outset, maximum within 4 h of admission and this can be termed as segregation of non traumatic serious cases. The zero mortality in the present study is another evidence to indicate that if cases are properly selected keeping in mind the limitations and lack of resources of peripheral centers, a good care can be given to those who fit into the facilities available at that centre.

Key words: Higher centers, Peritonitis, Segregation

INTRODUCTION

Abdominal emergencies are common in surgical practice. The lethality still remains high¹ and has been studied by modern statistical analysis also.² Many patients land in severe toxic state with delayed diagnosis and treatment.³
The presence of pus and fecal material adversely affects mortality. The volume of abdominal emergencies is so large that all these patients do not go to tertiary care center due to logistics prevailing in India.

Moreover, tertiary care centers may not be able to deal with such a large volume in view of the limit of their capacity-facilities and workforce. Past few decades have seen upgradation of clinical working and surgical profile of serious cases coming to peripheral centers which are not as equipped as tertiary care centers and are able to share a significant load of such cases.

These peripheral centers although under-resourced can tackle serious abdominal emergencies; it is difficult to provide surgical care to all such cases. Hence, realizing the strength and weaknesses of peripheral centers, the author decided to use an objective criteria or algorithm which could help in segregating and selecting right cases of abdominal emergencies, particularly perforating peritonitis so that mortality is avoided by taking up a wrong case. The cases which are beyond the purview of management of the peripheral centers are referred to a tertiary care center. The author has realized that by adopting such an objective policy the unnecessary load of routine cases or cases which can be managed at peripheral level will be filtered and not put undue load on a tertiary care center. The policy of segregating serious patients (which are to be referred to a tertiary care center) is also advantageous to prevent any outrage, damage to hospital, and manhandling of health-care professionals because otherwise any mortality in serious abdominal emergencies is impulsively reacted by the attendants.

This article elaborates the objective parameters on which patients are segregated, and the author has found it useful particularly over past decade.

**MATERIALS AND METHODS**

Although there are several scoring systems available for severe peritonitis, over past 10 years, 256 cases of perforation peritonitis coming to SGT Medical College, Budhera, Gurugram, formed the material of study. All patients were screened through following parameters.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Favorable</th>
<th>Unfavorable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt;50 years</td>
<td>&gt;50 years</td>
</tr>
<tr>
<td>De-hydration</td>
<td>Nil</td>
<td>Present</td>
</tr>
<tr>
<td>Pulse/B.P.</td>
<td>90/normal</td>
<td>&gt;90/systolic hypotension</td>
</tr>
<tr>
<td>Urine output</td>
<td>Normal</td>
<td>Decreased</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>&lt;9</td>
<td>&gt;9</td>
</tr>
<tr>
<td>S. Albumin</td>
<td>Normal</td>
<td>Decreased</td>
</tr>
<tr>
<td>Blood urea</td>
<td>Normal</td>
<td>Raised</td>
</tr>
</tbody>
</table>

These parameters were evolved by a pilot study where it was found that these parameters play a role in making decision of segregation of serious cases. All the patients were subjected to above 10 parameters and were finally grouped into two categories.

1. Category 1: Where ≤4 parameters were positive
2. Category 2: Where >4 parameters were positive, importance being given to urine output, S. Albumin, blood urea, and hemoglobin.

However, the clinical assessment of chest along with chest X-ray and cardiac assessment along with electrocardiography (ECG) was given veto power. By veto power, it is meant that if clinical assessment of chest and chest X-ray was normal as informed by the physician-patient was taken in otherwise referred to a tertiary care center even if it belonged to Category 1, similarly, if cardiac status and ECG were normal as informed by the physician, the case was taken in otherwise referred to a tertiary care center even if it belonged to Category 1.

Based on categorization as mentioned in table above, Category 1 patients were retained for further management at the peripheral centers while Category 2 patients were subjected to resuscitation by intravenous fluids, blood, antibiotics, etc., for 4 h. All the parameters as listed in the table above were again evaluated after 4 h and if the patient moved to Category 1 it was retained for further management. Otherwise, it was referred to a tertiary care center.

<table>
<thead>
<tr>
<th>Table 1: Categorization, n=256</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Categorization after resuscitation, n=66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>Veto criteria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Details of referred cases, n=53</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
</tr>
<tr>
<td>Veto</td>
</tr>
<tr>
<td>Veto cardiac</td>
</tr>
<tr>
<td>Category parameters</td>
</tr>
<tr>
<td>&gt;6 positive</td>
</tr>
<tr>
<td>&gt;7 positive</td>
</tr>
<tr>
<td>&gt;8 positive</td>
</tr>
</tbody>
</table>
We did not take blood gas analysis during our assessment at peripheral centers because this facility is not available.

RESULTS

After applying all these criteria, initially, 190 patients were found to belong to Category 1 while 66 to Category 2 [Table 1]. These 66 patients were subjected to intensive resuscitation and monitoring, and reevaluation was done after 4 h. As a result of resuscitation, 13 patients had climbed to Category 1 while 53 still remained in Category 2 [Table 2]. All these 53 patients were referred to an advanced care center and detailed analysis of these 53 patients showed that 9 patients belonged to veto criteria, i.e., in 3 patient's chest condition and/or chest X-ray was not optimal and were labeled by a physician as very high-risk patients. Another 6 patients were found to be extremely high risk on cardiac and ECG evaluation. These patients had either history of recent myocardial infarction or unstable angina or varying degrees of heart blocks or some kind of arrhythmia [Table 3]. In fact, these 9 patients were also subjected to intensive resuscitation which was actually uncalled for. Resuscitation should have been given only to 44 patients. However, this overlap on 9 patients of veto criteria occurred because opinions of physicians after the complete evaluation were available 2–3 h of start of resuscitation. Majority patients of Category 2 had eight positive criteria (22 patients), followed by 18 patients having 7 positive criteria. 2 patients each had five and six positive criteria [Table 3].

All the 203 patients who were taken in Table 4 were subjected to exploratory laparotomy where relevant pathology was appropriately dealt, i.e., closure of duodenal perforation or enteric perforation, etc. This was followed by a thorough peritoneal lavage and putting in abdominal drains all the operated cases of peritonitis were given standard post-operative treatment consisting of nil per orally, Ryle’s tube aspiration, IV fluids, IV antibiotics (cephalosporin gen III, aminoglycosides, and metronidazole), continuous oxygen for minimum 24 h, and analgesics. Once the patient passes flatus, Ryle’s tube aspiration decreased to 100–150 ml and the color of Ryle’s tube aspirate became that of gastric juice, the Ryle’s tube was removed and they were allowed orally. Early ambulation was our policy and stitches were removed on 12th–14th day. Those showing evidence of burst abdomen on 3rd–5th post-operative day in the form of copious serous discharge were taken up for emergency secondary suturing. Any superficial dehiscence encountered during post-operative periods or after removal of stitches was dealt appropriately. The operative findings of 203 operated patients are depicted in Table 5. Thus, we see that majority of the patients had duodenal perforation and enteric perforations. There were 2 patients having uterine perforations. In the present series, the mortality is nil due to segregation in serious cases. The morbidity in the form of various complications is depicted in Table 6. Superficial wound dehiscence and stitch sepsis were the most common complications in the present series.

DISCUSSION

The Indian subcontinent is a developing country where health-care delivery system still needs up gradation. By various statistical data released by Government of India, the doctor population of India is far from expected level. 70% of the population of this country resides in rural area and does not have prompt and good access to even specialist care what to say of super specialist services. Cost of Medicare of metro cities and corporate hospitals is a prohibitive factor for poor and rural population. Although steps are being taken at government level and efforts are going for improving health-care delivery to the last mean in the queue, yet, the gap cannot be allowed to remain unfulfilled in wait of development of the entire system. It is due to these reasons that health-care centers in Class 2 and 3 towns in India have to take lead. As already said, an entire load of serious illnesses requiring surgical intervention like perforative peritonitis cannot be taken by tertiary care centers for obvious limitations of the hospital and population both. The peripheral centers have to play a big role to fulfill the above gap by providing health services at
a lower cost. However, at the same time, these peripheral centers are not as fully developed and well equipped and have to seek the help of advanced/tertiary care/higher centers. In such a situation, if some objective criteria are applied for segregating serious illnesses requiring surgical intervention, for example, perforative peritonitis, following things can be achieved:

1. Avoidance of unnecessary mortality by directing very high-risk cases directly to tertiary care centers, rather than referring them at a later stage from peripheral centers.
2. In the eventuality of death of such serious cases at peripheral centers (not referred to higher centers), emotionally charged relatives and attendants go on rampage, damage, and destroy the hospital property and building and manhandle the health-care professionals. These problems get compounded if legal remedy is sought for such criminal activities. This all can be avoided by following our policy of referring based on objective criteria.
3. Segregation of serious cases like perforative peritonitis will reduce undue caseload on tertiary care centers allowing clinicians of such centers to really focus on limited serious cases.

By the results in the present study, it would be a good idea to segregate more serious cases right at the outset maximum within 4 h of admission and this can be termed as triage of non-traumatic serious cases. Despite huge advances in diagnostics, antibiotics, and monitoring, the mortality still remains very high.\(^\text{50}\) The zero mortality in the present study is another evidence to indicate that if cases are properly selected keeping in mind the limitations and lack of resources of peripheral centers, a good care can be given to those who fit into the facilities available at that center. The complications encountered in the present series [Table 6] are important causes of prolonged hospitalization and significant action requires to be taken for them to reduce the duration of hospitalization.

Although the criteria adopted in the present study are still in evolving stage yet remain very useful to as of now for peripheral centers as a single significant measure to reduce mortality. Continued analysis of various factors from various high-volume peripheral centers encountering such cases can result into the evolution of better/addition criteria. Needless to say, study involving the large number of cases is required to further improve on the scoring system, so that perfect triage is done and mortality is brought to zero in under-resourced, underprivileged, and not so well equipped peripheral centers.

**REFERENCES**


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Study of Various Factors to Improve Outcome in Enteric Perforation and Reduce Morbidity

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Abstract

Background: Intestinal perforation because of typhoid is quite common in the developing countries like India. Enteric perforation leads to generalised peritonitis and septicaemia. It is usually associated with high mortality and morbidity which further gets compounded at places where availability of medical facilities in India is poor. Clinical presentation may vary depending upon the time lapse between perforation and seeking an organised institutional care. Although there is tremendous improvement in diagnostics, antibiotics, operative technology and monitoring, yet morbidity and mortality of typhoid perforation remains high. In our centre, all patients are not taken up for further management. Patients who have normal chest and cardiac status with normal or near normal haematobiochemistry are taken so as to avoid unnecessary mortality and bad effects thereafter. Any patient where clinical evaluation suggests evidence of ARDS or septic shock are generally referred to a higher centre for better care and monitoring.

Materials and Methods: A total of 106 cases were studied where after applying screening/filter of cardiac status, chest status various clinical factors, hematological and biochemical factors, 88 cases (Table 2) were segregated for further management at our center. These 88 cases were proved to be of typhoid by widal test and /or blood culture and/or histopathology (Table 3) of the excised margins of the ulcer during exploratory laparotomy. After optimization, these patients were taken up for exploratory laparotomy by mid line incision. Operative findings consisting of volume and quality of peritoneal fluid (intestinal, feculent or pus or mixed) as well as site and number of intestinal perforations were recorded. All the peritoneal fluid was drained, perforation was repaired or resection carried out in two layers followed by thorough peritoneal lavage. A wide bore drain was placed in the pelvis and laparotomy wound was closed. Patient was closely monitored in post-operative period for vitals, urine output and general progress. Patient was started orally whenever passed flatus and bowel sounds returned. Any complication like superficial wound dehiscence or burst abdomen or stitch sepsis was accordingly managed. Stitches were removed on 12-14 post-operative day.

Result: In the present series there were total of 88 patients (Table 2). 60 were males and 28 were females. The mean age of the patients was 38.34 (± 12.08 ). Operation was done within 12 hours of onset of symptoms in 48 patients while 40 cases underwent surgery 12 hours of onset of symptoms. Morbidity was 9/48 (18.75 %) in former group and 20/40 (50%) in later group. Detailed analysis revealed that delay was mostly before reaching the hospital. It was also found that 62 patients out of 88 had received some kind of treatment before reaching our hospital in form of intravenous fluids, antibiotics and analgesics. Remaining 26 patients reached the hospital directly without taking any treatment. It is the former group of 62 patients who had maximum delay obviously because of taking of some treatment before reaching this hospital. Out of 68 patients showing positive widal test, (Table 3) only 47 (69.11%) showed specific histological features of typhoid in the freshened margin of the ulcer. Remaining 21 (30.88%) showed non-specific inflammation. Majority of the operated patients of enteric perforation had single perforation (70 patients i.e. 79.54%), 16 patients (18.18%) had typical perforation and 10 cases (11.11%) had multiple perforations requiring resection and anastomosis. Eighty six patients were managed by simple closure of perforation in 2 layers (inner by Polyglactin 910 continuous suture of 000 size while outer layer of interrupted silk suture of 000 size). Burst abdomen was found in 5.68 %, superficial dehiscence in 16.62 %, stitch abscess in 19.31 %, UTI in 3.40% as part of hospital acquired infection and residual intra-abdominal abscess was seen in 7.95 % patients. In the present series none had faecal fistula and there was no mortality. The duration of hospital stay ranged from 9 to 28 days with a mean of 14.8 days. Since mortality in the present series was nil due to initial screening at the hospitalization stage, we have analyzed the morbidity as prognostic factors of better and eventless outcome and are given in Table 5.

Conclusion: To conclude, the present series has shown that morbidity and prolonged hospitalization occurs with factors like delayed presentation and surgery, copious peritoneal contaminated fluid (more than 1 liter) and multiple perforations.

Key words: Enteric perforation, Various factors, Morbidity

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INTRODUCTION

Intestinal perforation due to typhoid is quite common in the developing countries like India. Enteric perforation leads to generalized peritonitis and septicemia. It is usually associated with high mortality and morbidity which further gets compounded at places where availability of medical facilities in India is poor. Clinical presentation may vary depending on the time lapse between perforations and seeking an organized institutional care.

Although there is tremendous improvement in diagnostics, antibiotics, operative technology, and monitoring, yet morbidity and mortality of typhoid perforation remains high. All patients are not taken up for further management. Patients who have normal chest and cardiac status with normal or near normal hematobiochemistry are taken so as to avoid unnecessary mortality and bad effects thereafter. Any patient where clinical evaluation suggests evidence of acute respiratory distress syndrome or septic shock is generally referred to a still higher center for better care and monitoring. We are presenting a series of 106 cases of typhoid perforation over past few years where disease profile, operative profile, and outcome are analyzed and based on this various factors are found which improve clinical outcome and reduce morbidity.

MATERIALS AND METHOD

A total of 106 cases were studied where after applying screening/filter of cardiac status, chest status various clinical factors, hematological, and biochemical factors, 88 cases were segregated for further management at our hospital, SGT Medical College. These 88 cases were proved to be of typhoid by Widal test and/or blood culture and/or histopathology of the excised margins of the ulcer during exploratory laparotomy.

Soon after the decision of admitting the patient for further management, a detailed history was taken with particular emphasis on duration of fever, abdominal pain, and constipation. Detailed physical examination was carried out laying emphasis on chest and cardiac status. The urine output was recorded, and the patient was routinely catheterized for monitoring urine output. Simultaneous fluid resuscitation and antibiotics, etc., were started and an abdominal radiograph in erect posture was taken to see the gas under diaphragm.

After optimization, these patients were taken up for exploratory laparotomy by midline incision. Operative findings consisting of volume and quality of peritoneal fluid (intestinal, feculent or pus, or mixed) as well as site and number of intestinal perforations were recorded. All the peritoneal fluid was drained, perforation was repaired or resection carried out in two layers followed by thorough peritoneal lavage. A wide bore drain was placed in the pelvis and laparotomy wound was closed. The patient was closely monitored in post-operative period for vitals, urine output, and general progress. The patient was started orally whenever passed flatus and bowel sounds returned. Any complication such as superficial wound dehiscence or burst abdomen or stitch sepsis was accordingly managed. Stitches were removed on 12–14 post-operative day.

RESULTS

Mean duration of symptoms from onset to presentation in the hospital was 12.2 ± 5.1 days with range of 3–18 days. 56 patients presented within 2 weeks while 32 presented after 2 weeks from the onset of symptoms. Morbidity was 9 from former group and 20 in later group [Table 5].
Table 5: Variables associated with morbidity

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Factors</th>
<th>Number of cases/percentage having morbidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>17/60 (28.33)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>9/28 (32.14)</td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td>Within 2 weeks</td>
<td>9/56 (16.07)</td>
</tr>
<tr>
<td></td>
<td>&gt;2 weeks</td>
<td>20/32 (62.5)</td>
</tr>
<tr>
<td>Delay in operation</td>
<td>&lt;12 h</td>
<td>9/48 (18.75)</td>
</tr>
<tr>
<td></td>
<td>&gt;12 h</td>
<td>20/40 (50)</td>
</tr>
<tr>
<td>No of perforations</td>
<td>Single perforation</td>
<td>2/70 (2.85)</td>
</tr>
<tr>
<td></td>
<td>Two perforations</td>
<td>6/16 (37.5)</td>
</tr>
<tr>
<td></td>
<td>Multiple perforations</td>
<td>0/12 (0)</td>
</tr>
<tr>
<td>Amount of peritoneal fluid</td>
<td>&lt;1 L</td>
<td>17/88 (19.31)</td>
</tr>
<tr>
<td></td>
<td>&gt;1 L</td>
<td>22/88 (25)</td>
</tr>
<tr>
<td>Burst abdomen</td>
<td>Simple closure</td>
<td>18/86 (20.93)</td>
</tr>
<tr>
<td></td>
<td>Resection and anastomosis</td>
<td>0/12 (0)</td>
</tr>
</tbody>
</table>

In the present series, where a total of 88 patients were taken in after applying the screening criteria on a total of 106 patients. Of these, 60 were males and 28 were females, the male-to-female ratio being 2.14:1. The mean age of the patients was 38.34 ± 12.08, youngest being 18 years of age while oldest being 52 years of age. The various clinical features with which they presented are given in Table 1 where abdominal pain was almost universal complaint.

As far investigations are concerned, all 88 patients showed gas under diaphragm. Ultrasonography was done in all the patients and showed free fluid ranging from ++ to +++ with dilated loops virtually in all the patients. Widal test was positive in only 68 patients (77.27%), and blood culture was positive in 16 patients only.

Operation was done within 12 h of onset of symptoms in 48 patients while 40 cases underwent surgery 12 h of onset of symptoms. Morbidity was 9/48 (18.75%) in former group and 20/40 (50%) in later group.

Average delay from onset of symptoms to operation was 18 h which included time taken for optimization for surgery after hospitalization by way of administration of intravenous fluids also. Average time taken for optimization was 3.8 h. Detailed analysis revealed that delay was mostly before reaching the hospital. It was also found that 62 patients out of 88 had received some kind of treatment before reaching our hospital in the form of intravenous fluids, antibiotics, and analgesics. Remaining 26 patients reached the hospital directly without taking any treatment. It is the former group of 62 patients who had maximum delay obviously due to taking of some treatment before reaching this hospital.

Of 68 patients showing positive Widal test, only 47 (69.11%) showed specific histological features of typhoid in the freshened margin of the ulcer. Remaining 21 (30.88%) showed non-specific inflammation; but since they all had positive Widal test, they were eventually considered cases of enteric perforation.

Majority of the operated patients of enteric perforation had single perforation (70 patients, i.e., 79.54%), 16 patients (18.18%) had two perforations, and only 2 cases (2.27%) had multiple perforations requiring resection and anastomosis. 86 patients were managed by simple closure of perforation in two layers (inner by Polyglactin 910 continuous suture of 000 size while outer layer of interrupted silk suture of 000 size).

The complications encountered are listed in Table 4. Burst abdomen was found in 5.68%, superficial dehiscence in 16.62%, stitch abscess in 19.31%, urinary tract infection in 3.40% as part of hospital-acquired infection, and residual intra-abdominal abscess was seen in 7.95% patients. In the present series, none had fecal fistula and there was no mortality. The duration of hospital stay ranged from 9 to 28 days with a mean of 14.8 days.

Since mortality in the present series was nil due to initial screening at the hospitalization stage, we have analyzed various factors for better and eventless outcome and are given in Table 5.

DISCUSSION

Ileal perforation following typhoid fever is still one of the most common causes of peritonitis in developing and underdeveloped world. It is reported to be rare phenomena in the western world. Males have been found to be dominantly affected in the present series. Males are said to be more exposed to the infection with an increased risk of necrosis and perforation due to the immune mechanism and genetic predisposition.[1] Typhoid disease is a disease of young productive age group. Although the age group profile of the present series compares well with some of the published series,[2-4] Yet, the mean age of the present series is slightly higher than other series.[3]

The presenting symptoms and clinical features are by and large quite similar to any other acute abdominal condition. The decision of laparotomy was largely taken by the fact of the presence of gas under diaphragm in patient having features of generalized peritonitis on clinical evaluation (100%). The diagnosis of enteric perforation is of course suspected by a history of fever and positive Widal test (77.27%). After reviewing the histological profile of freshened edges of the ulcer, it was found that even those who had positive Widal test, histologically, there were no
specific findings suggestive of typhoid and showed only non-specific inflammation (30.88% of those showing positive Widal test).

The delay in operation, wherever occurred was mainly due to prehospital constraint, namely, taking some form of treatment outside or transport or non-availability of transport or sometimes non-availability of the decision-making attendants like parents.

Typhoid fever is caused by Salmonella typhi in areas where poor socioeconomic strata and unhygienic conditions prevail. The incubation period is 1–14 days and clinical features start with bacteremia, high-grade fever, and signs of systemic sepsis. Blood counts are generally low which was seen in majority of our patients, i.e., 86/88 (97.72%). Bradycardia was found in 17.85% patients. Later, bacteria localize in Peyer’s patches where capillary thrombosis leads to necrosis and perforation takes place usually in the 3rd week of the disease. The terminal part of intestine (approximately 60 cm) is particularly edematous and friable. Late presentation, delay in operation, multiple perforations, and presence of copious peritoneal fluid (laden with pus and feculent material to the tune of more than 1 L) adversely affects the outcome, i.e., mortality or morbidity. The quality of peritoneal fluid and delay in operation also determines the friability of gut. The literature also mentions that profuse peritoneal exudates do affect the outcome.\[3,6\] Surgery offers best chance of survival in enteric perforation.\[7\] Although a variety of procedures are undertaken for enteric perforation, namely, closure, resection and anastomosis, and ileostomy, in the present series, majority of cases settled with simple closure of perforation and resection and anastomosis were needed in only 2 patients (50%). Fecal fistula is a catastrophic complication, but luckily was not seen in the present series due to initial screening of cases at the hospitalization stage. Burst abdomen did of course occur in (5.68%) patients.

Mortality of the present series is nil largely due to the fact the cases were screened at the initial stage and serious cases requiring care at tertiary care center were referred at the outset. Nonetheless, the mortality is reported in the range of 9–43%\[3\] in the literature. However, the reports of mortality are 6.8% from Nepal\[2\] and 10.5% from India.\[4\] Mortality rates reported from the western world are 1.5–2% where socioeconomic infrastructure is well developed.\[8\] Incidence of fecal fistula is zero, in present series, but it is reported to be 3.8%,\[9\] 7.8%,\[2\] 8%,\[3\] and 16.5%.\[4\] Burst abdomen added to the morbidity in the present series.

To conclude, the present series has shown that gender, delayed presentation and surgery, copious peritoneal contaminated fluid (more than 1 L), and multiple perforations are various factors that improve outcome in enteric perforation and reduce morbidity.

REFERENCES


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Expression of p53 Protein by Immunohistochemistry in Urothelial Neoplasm: A Hospital-based Study from Eastern India

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Abstract

Background: It is difficult to predict which urothelial neoplasm would subsequently recur or progress to muscle invasive tumors or produce metastasis.

Objectives: The aim and objective of the study were to evaluate the scope of immunohistochemical grading of p53 in urothelial neoplasms with regard to grade and histopathological pattern.

Materials and Methods: Forty-five consecutive patients were taken, and samples were obtained from transurethral resection. Histopathological examinations were performed, and the grading was done according to the World Health Organization/International Society of Urological Pathology consensus classification of urothelial neoplasms. Immunohistochemical staining for p53 was performed on formalin-fixed paraffin-embedded tissue sections with appropriate positive and negative control.

Results: We found 5 patients of papillary urothelial neoplasm of low malignant potential (PUNLMP), 12 cases of non-invasive low-grade papillary urothelial carcinoma, and 18 patients with non-invasive high-grade papillary urothelial carcinoma including 10 cases of invasive urothelial carcinoma. All 5 PUNLMP cases showed negative results. 3 of 12 low-grade papillary urothelial carcinoma had high nuclear p53 accumulation, while all of the 16 papillary high-grade carcinomas had high p53 index. All the invasive urothelial carcinomas were high p53 expressor.

Conclusion: A trend of expression of p53 in urothelial neoplasm supports the notion that mutation of p53 gene might be unrelated to the development of urothelial neoplasms but definitely play a crucial role in progression of the malignancy.

Key words: Urothelial neoplasm, p53 index, immunohistochemistry

INTRODUCTION

The p53 gene is located on chromosome 17p13.1, and it is the most common target for genetic alteration in human tumors. The name of the gene is TP53 and the protein is p53, but for the sake of simplicity, we refer to both as p53. A little over 50% of human tumors contain a mutation of this gene. p53 is a transcription factor that is at the center of a large network of signals that sense cellular stress such as DNA damage, shortened telomeres, and hypoxia. P53 thwarts neoplastic transformation by three interlocking mechanisms: Activation of temporary cell cycle arrest, induction of permanent cell cycle arrest, or triggering programmed cell death. p53 activates transcription of the mir34 family of micro RNAs. Targets of mir34 include proproliferative genes such as cyclins and antiapoptotic genes like BCL2. With loss of function of p53, DNA damage goes unrepaired; mutations accumulate in dividing cells and the cell marches along a one-way street leading to malignant transformation.[10]

It is well documented that many mutations like heat shock protein have been associated with mutant form of p53 and lead to an increased half-life of the p53 protein. Mutated p53 may bind to wild-type p53 and change it to the mutated
conformation. Since conformation and oligomerization of p53 are putatively important for its function, the function is probably changed in these cases as well. p53 immunohistochemistry has been suggested as an aid in the diagnosis of malignancy. P53 mutations are common in a variety of human tumors, and homozygous loss of p53 occurs in carcinoma of the lung, colon, breast, and others. The frequency of p53 mutation is lower in endometrial and thyroid carcinomas. To shed some light on p53 mutation in urothelial carcinoma, we analyzed 30 cases in our institution correlating immunohistochemical expression of p53 with regard to grade, stage, and outcome of the patient. Urinary bladder carcinoma is the seventh most common cancer worldwide, representing 3.2% of all adult cancers. Urothelial carcinoma is a recurrent neoplasm with a significant number of cases progressing to an infiltrating and very aggressive disease. Identifying the prognostic factors of progression is a challenge so that high-risk patients who may be a candidate for a radical cystectomy may be identified.

The aim of our study was to perform grading and staging of urothelial neoplasms and semiquantitative analysis of p53 immunoreactivity in paraffin-embedded sections. Then, statistical correlation was done between p53 positive immunostaining, grade, and stage of urothelial neoplasm.

**MATERIALS AND METHODS**

It was a prospective study of 45 consecutive patients of urothelial neoplasms attending the Department of Urology from March 2011 to April 2012. The patients were informed and consents were obtained. Urothelial neoplasms of different grades were diagnosed according to the World Health Organization/International Society of Urological Pathology (WHO/ISUP) consensus classification of urothelial neoplasm of the urinary bladder. Anti-p53 mouse monoclonal antibody (Clone-DO7, Cell Marque, Rocklin, CA, USA) was used which reacted with mutant as well as a wild form of p53. The immunohistochemical stain was applied on 4 µm sections of formalin-fixed paraffin-embedded tissue. Epitope retrieval was done in conjunction with a microwave. Immunostaining was evaluated by counting 500 tumor cells for each case at high power (×400, magnification). Breast carcinoma cells were taken as positive control.

Samples demonstrating at least 10% nuclear reactivity were considered to be positive for p53. A high p53 index was defined when more than 50% or more nuclei were stained. Nuclear positivity between 10 and 50% was considered as low nuclear positivity.

**RESULTS**

The total of 45 cases of transurethral bladder resection specimens was processed for histopathological and immunohistochemical analysis. The cases were tabulated according to the WHO/ISUP 2004 Classification, and we found a clear trend of high-grade lesions (total 28 of 45) in Indian community because of the habit of late presentation. p53 analysis showed high expression in all the 10 cases of invasive carcinomas and 16 of 18 cases of non-invasive high-grade urothelial carcinomas. None of the high-grade cases showed negative expression. However, only two cases of non-invasive high-grade urothelial carcinoma showed low expression because of squamous metaplasia. 9 of 12 non-invasive low-grade urothelial carcinomas were low express or of p53. All the cases of PUNLMP were negative.

**DISCUSSION**

Mutated p53 gene is a common genetic abnormality in transitional cell carcinoma of the bladder. Wild-type p53 protein has a short half-life, but the protein encoded by mutated p53 remains active for a long period. Therefore, mutation of p53 in invasive urothelial carcinoma was high in terms of higher grade and invasiveness, i.e., mutation of p53 gene might be unrelated to the development of urothelial neoplasms but definitely play a crucial role in the progression of the malignancy.
p53 gene results in p53 accumulation in the cells nuclei. This accumulation is detectable with immunohistochemical methods and correlates with p53 gene mutation. Several works have already been done in this regard.

Soni et al. worked on p53 immunohistochemistry in transitional cell carcinoma and dysplasia of the urinary bladder and found more p53-positive cases in Grade II–III tumors than in Grade I tumors ($P = 0.004$) and significantly more p53 positivity in stage T2–T4 tumors than in stage T1 tumors. Serth et al. recommended p53 immunohistochemistry as an independent prognostic factor for superficial transitional cell carcinoma of the urinary bladder, since they found that 85.7% urothelium tumors with more than 20% of cells positive for p53 had disease progression with muscle-invasive growth ($P < 0.001$) compared to the proliferative rate by immunostaining for proliferating cell nuclear antigen ($P = 0.0033$). In their study, the positivity of p53 was a significant indicator for relapse of bladder cancer ($P = 0.0029$). Our results also revealed high p53 positivity in high-grade papillary urothelial carcinomas and invasive carcinomas.

Mallofré et al. studied immunohistochemical expression of CK20, P53, and Ki67 as objective markers of urothelial dysplasia. In their series, CK20 was positive through the full thickness of urothelium in 72% of cases, p53 was positive in 80% of cases, and Ki67 in 94% of cases. Thus, immunohistochemistry was found to be a useful tool to distinguish between dysplastic changes from reactive atypia. Unfortunately, we could not find any isolated case of urothelial dysplasia or CIS possibly because most of our patients reported late in the course of their disease which is the natural trend in developing countries.

Recently, Kalantari and Ahmadnia conducted a study on p53 overexpression in bladder urothelial neoplasms and suggested that the difference of nuclear p53 accumulation between PUNLMP and low- and high-grade TCC (invasive or non-invasive) was statistically significant ($P < 0.001$), whereas the difference between invasive high-grade and non-invasive low-grade carcinoma was not statistically significant. From this standpoint, they justified the importance of PUNLMP in the new WHO/ISUP classification system. We observed that most of the PUNLMPs showed negative results for p53, but there was a significant difference in p53 positivity in low-and high-grade urothelial neoplasm.

Gonzalez et al. worked on the prognostic value of combined p53 and survivin in PT1G3 urothelial carcinoma of the
urinary bladder. Tumors with the invasion of the lamina propria above the level of muscularis mucosa (or the large vessels present at this level) were subclassified as pT1a and tumors with infiltration of deep lamina propria beyond the muscularis mucosa were subclassified as pT1b, and it was seen that patients with pT1b tumors had a significantly increased risk of local progression and metastasis. They reported that percentage of stained nuclei with p53 was higher for patients with tumor progression than for patients without tumor progression.[13]

Microvessel counts are strongly associated with recurrence and length of survival in patients with bladder cancer. There is a significant correlation between increased nuclear accumulation of p53 and increased microvessel counts. One of the mechanisms of p53-mediated tumor progression may be the promotion of an angiogenic response, which could have therapeutic applications.[9]

In our series, we found that two patients of non-invasive high-grade papillary urothelial carcinoma had low expression of p53 and these two tumors showed prominent squamous differentiation. However, it is reported in literature that in 15–20% of tumors, despite p53 gene mutation, its product does not accumulate in the nucleus.[8] Some p53 gene point mutations may result in lack of or severe decrease in p53 protein synthesis. On the other hand, in a proportion of tumors, despite the nuclear accumulation of protein, there is no mutation of p53 gene.[9] It has been shown that some cellular oncogenic products like mouse double minute 2 lead to overexpression of p53 without any detectable p53 mutation.[12,13] Thus, a p53 mutation, even though present in a large number of transitional cell carcinomas, it represents only one event in the putative pathway of the evolution of these tumors. In early stages of bladder cancer, deletion of chromosome 9 may be the only genetic abnormality, suggesting an initial role in the development of the urothelial cancer.[14,15] Carcinomas with only chromosome 9 aberration do not show progression. Since p53-positive immunohistochemistry is associated with aggressive and recurrent tumors, it possibly plays a role in the evolution of the tumors to a higher grade and indicates the potential for progression.

CONCLUSION

Our results show that p53 protein expression is associated with high-grade urothelial neoplasm and advanced stage of the disease, and it possibly plays a role in the evolution of the tumors to a higher grade. Our data were on a small sample size, but the significant differences we observed in tumor progression encourage us to perform future research. If the high prognostic value of p53 protein expression in urothelial neoplasm is confirmed in larger prospective trials, more aggressive therapeutic strategies could be discussed for patients with p53-positive tumor specimens.

REFERENCES

Incidence of Post-operative Pain in Single versus Multiple Visit Root Canal Treatment of Vital and Non-vital Single Rooted Teeth

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Abstract

Aim: The aim of the is to evaluate the incidence of Post-operative pain in Single versus Multiple visit Root Canal treatment of vital and non-vital single rooted teeth in Jammu population.

Materials and Methods: 200 subjects were selected fulfilling the inclusion criteria and were divided into 2 groups of 100 subjects each. Group I included vital pulp subjects out of which 50 were endodontically treated in a single visit and 50 in multiple visits. Group I included vital pulp subjects out of which 50 were endodontically treated in a single visit (SV) and 50 in multiple visits (MV). Group II included non-vital pulp subjects out of which 50 were endodontically treated in a single visit and 50 in multiple visits. The subjects (both groups) were asked about their experience of post-operative pain and to rate it. A follow-up evaluation was made of the radiographic findings and clinical data. The data was subjected to statistical analysis using the chi-square test by SPSS software version 20.

Results: Statistically insignificant relationship was found between different genders and pain perception (p=0.8006). Also, no statistically significant realion of pain perception with age of the subjects (p=0.9509). It was also found that the difference in pain perception among individuals receiving endodontic treatment in single vs multiple visit was not significant (p=0.9213) and there was no significant difference in the incidence of post operative pain between vital and non vital teeth.

Conclusion: It can be concluded that there was no difference in the incidence of postoperative pain between vital and non vital teeth. The majority of patients in either group’s reported no or only mild pain. Also, the number of visits does not have any impact on the amount of pain. However it is suggested that number of visits for endodontic treatment should be less to minimize the patient discomfort.

Key words: Root canal, Endodontic, Pain, Pulp, Jammu

INTRODUCTION

Traditionally, root canal treatment or endodontic treatment was performed in multiple visits, with medication between root canal preparation and obturation, which mainly aims to reduce or eliminate microorganisms and their by-products from the root canal system before obturation. Multiple-visit root canal treatment (MV) is well-accepted as a safe and common therapy [1]; however, in recent years, there is a growing concern about the necessity of multiple appointments in endodontic treat- ment because no significant differences in antimicrobial efficacies have been reported between the single- (SV) and multiple-visit treatments. [2] Furthermore, the recent invention of rotary nickel-titanium systems and improvements in the understanding of irrigation dynamics and delivery systems have facilitated the mechanical instrumentation and disinfection of the root canal, which makes the single-appointment treatment more convenient than before. Along with other advantages including timesaving,
cost-effectiveness, better patient acceptance, and reduction of the interappointment infection risks, single-visit root canal treatment has become an acceptable treatment regimen. [3]

A one visit root canal treatment is attractive to a patient because it saves time and would probably reduce the cost of the procedure. In addition one visit treatment would be expected to be less stressful to the anxious patient. The patient is not disturbed by the additional anesthetic injections, the replacement of the rubber dam, the initial placement and later removal of intracanal medication and seals, and the time spent by the clinician in refreshing his memory and tactile sensation regarding prepared canal anatomy, tooth length etc. Furthermore, the problems of intervisit leakage, loss of temporary seal, or any of the accidents that can and do occur between the visits are solved. Perhaps the most important advantage is the prevention of root canal contamination and/or bacterial regrowth that can occur when the treatment is prolonged over an extended period. [4]

The disadvantages of single visit procedures are also obvious. It eliminates some of the controls available in the multiple visit procedures, such as culturing to check the effectiveness of the biomechanical preparation and ability to apply “tincture of time”, to reevaluate tissue responses following treatment procedures and in the event of a flareup, the emergency procedures for drainage are complicated, since artificial fistulation or the removal of fillings is needed. [4]

Numerous studies evaluating the effectiveness and post-treatment pain of single- versus multiple-appointment root canal treatment have been published, which reported no significant differences in effectiveness (healing rates) and postoperative pain between these 2 treatment regimens. [5-7] However, most of the previous systematic reviews focused primarily on comparing procedures without considering the pretreatment pulpal status. [5-7] Many studies have demonstrated the association of pulpal and periapical status with the outcome of endodontic treatment. [8-12] The present study is conducted with the aim of the is to evaluate the incidence of Post-operative pain in Single versus Multiple visit Root Canal treatment of vital and non-vital single rooted teeth in Jammu population.

**MATERIALS AND METHODS**

Out of 453 subjects coming to the Department of Conservative Dentistry, Indira Gandhi Govt. Dental College, Jammu 200 subjects with an age range of 16 to 35 years of age were selected fulfilling the inclusion criteria and were divided into 2 groups of 100 subjects each.

### Inclusion Criteria
- Permanent dentition
- Patients requiring endodontic treatment of anterior teeth

### Exclusion Criteria
- Patients requiring endodontic treatment of anterior teeth
- Any systemic condition

Group I included vital pulp subjects out of which 50 were endodontically treated in a single visit and 50 in multiple visits. Group I included vital pulp subjects out of which 50 (25 Males and 25 females) were endodontically treated in a single visit and 50 (25 Males and 25 females) in multiple visits. Group II included non-vital pulp subjects out of which 50 (25 Males and 25 females) were endodontically treated in a single visit and 50 (25 Males and 25 females) in multiple visits.

The subjects (both groups) were asked about their experience of post-operative pain and to rate it as:-

- **Pain was recorded as none, slight, moderate, or severe:**
  - No pain: The treated tooth felt normal. Patients don’t have any pain.
  - Mild pain: Recognizable, but not discomforting, pain, which required no analgesics.
  - Moderate pain: Discomforting, but bearable, pain (analgesics, if used, were effective in relieving the pain).
  - Severe pain: Difficult to bear (analgesics had little or no effect in relieving the pain). [13]

A follow-up evaluation was made of the radiographic findings and clinical data. The data was subjected to statistical analysis using the chi-square test by SPSS software version 20.

### RESULTS

Table 1 showed that there was statistically insignificant relationship between different genders and pain perception (p=0.8006).

Table 2 showed no statistically significant realtion of pain perception with age of the subjects (p=0.9509).

Table 3 showed that the difference in pain perception among individuals receiving endodontic treatment in single vs multiple visit was not significant (p=0.9213).

Table 4 showed that there was no significant difference in the incidence of post operative pain between vital and non vital teeth.
DISCUSSION

The study was conducted to evaluate the incidence of postoperative pain in single versus multiple visit root canal treatment of vital and non-vital single rooted teeth in Jammu population.

The findings of our study showed that the frequency and severity of pain did not have a significant difference between vital and non vital teeth. These findings are in accordance with the results of Ince B et al. and Genet et al. However, various studies evaluated a number of factors concerning the etiology of postoperative and it was found that flare-ups are more likely to occur in necrotic cases than in vital cases.

The present study also found out there was no difference in pain perception of individuals, whether treated in a single visit or in multiple visits. Similar results were found by Ince B et al. in their study. Also one-visit therapy had some advantages like reducing the number of operative procedures, which in turn reduces patient discomfort. However some studies in the past concluded that the number of treatment visits also has a significant effect on postoperative pain due to the high risk of inter-appointment microbial leakage through temporary restorations.

The results of the present study also revealed that there was no significant difference in the pain perception in different age groups which is in agreement with the studies done by Balaban FS et al., Eleazer PD et al., Matusow RJ and Kane AW et al. who found similar results but is contradictory to the findings of Toosy A. who concluded showed a positive correlation between post operative pain and advancing age.

The results of our study showed that there was no significant difference in the pain perception in different genders, which is also in agreement with the studies done by various researchers.

The current study had some limitations such as only single rooted teeth were evaluated for the incidence of postoperative pain and different teeth in both the jaws with multiple roots should be considered to achieve more appropriate results about pain perception.

CONCLUSION

It can be concluded that there was no difference in the incidence of postoperative pain between vital and non vital teeth. The majority of patients in either group have reported no pain or only mild pain. Also, the number of visits does not have any impact on the amount of pain. However it is suggested that number of visits for endodontic treatment should be less to minimize the patient discomfort.

REFERENCES

Prevalence of Caries in Lower Anterior Teeth Bonded with Fixed Orthodontic Retainer in Jammu Population

Ritesh Gupta¹, Bhanu Kotwal², Nanika Mahajan³, Simran Kaur⁴, Sharad Kharyal⁵, Neetu Gupta⁶


Abstract

Aim: To find the prevalence of caries in lower anterior teeth bonded with fixed orthodontic retainer after one year of orthodontic treatment completion in Jammu population.

Materials and Methods: Out of a total sample size of 157 subjects aged 15-25 years coming to the Department of Orthodontics in Indira Gandhi Government Dental College, Jammu, 100 were selected based on the inclusion criteria and were equally divided into 2 groups of 50 patients each. Group I contains 25 males and 25 females who were given bonded canine to canine retainer in lower anterior teeth after orthodontic treatment whereas Group II consists of 25 males and 25 females who were given removable retainers. Lower anterior teeth from 3 to 3 of every subject in both the groups were examined both clinically and radiographically. These subjects were provided with retainers post orthodontic treatment from 1 year.

Results: Majority of the subjects showed causative lesion relation to Central Incisors and Lateral Incisors with fewer incidences of caries in canines. However, the difference between genders is statistically insignificant (p=0.9012). There are more incidences for caries in Central and Lateral Incisors in comparison to canines with insignificant association with different genders (p=0.6666). There was statistically insignificant relation between caries incidence for different teeth in two groups (p=0.6475).

Conclusion: It can be concluded that the mandibular central and lateral incisors in the experimental group had equal caries frequency compared to each other, but with higher frequency when compared to canines. In spite of increased plaque accumulation around bonded orthodontic retainer, patient can prevent damage to their teeth by good oral hygiene with various oral hygiene products available.

Key words: Prevalence, Caries, Bonded orthodontic retainer, Jammu

INTRODUCTION

One of the major concerns for every orthodontist is retaining orthodontically moved teeth in their new position. Various appliances have been introduced in the past for better stability and maintenance of orthodontic treatment results. Several authors in their studies related long-term stability of achieved orthodontic results to maintenance of intercanine width and arch form, interincisal angle correction and post treatment growth respectively.¹⁻³ According to several studies, most of the relapse occurs during the first two years after the completion of treatment and in addition to it, there is a continuous risk of teeth change position throughout life which is due to aging processes and the inheritance/genetics of the individual.⁶⁻⁸ Few authors found that that the gingival elastic fibers contribute to relapse after correction of rotations and favored circumferential supracrestal fibroplasty to prevent rotational relapse.⁹,¹⁰
In spite of the previously conducted studies, orthodontists concluded that the only effective method to avoid relapse after orthodontic correction of malaligned teeth is by placement of fixed permanent bondable retainer for decades or throughout life.

Bondable fixed retainers consist of a length of orthodontic wire bonded with composite from canine to canine or premolar to premolar in the mandibular arch. The major advantage of lingually bondable retainers is that they are compliance free but can interfere with the maintenance of the oral hygiene which leads to increased plaque accumulation and can cause iatrogenic damage to the teeth and supporting structures.[11-13]

With the introduction of different types of wires and bonding materials for bonded retainers, their evaluation for their effects on oral hygiene status should be done.

Therefore, the purpose of this study was to evaluate the prevalence of caries in lower anterior teeth bonded with fixed orthodontic retainer in Jammu population both clinically and radiographically.

**METHODOLOGY**

Out of a total sample size of 157 subjects aged 15-25 years coming to the Department of Orthodontics in Indira Gandhi Government Dental College, Jammu, 100 were selected based on the inclusion criteria and were equally divided into 2 groups of 50 patients each. These subjects were provided with retainers post orthodontic treatment from 1 year.

**Inclusion Criteria**
- Permanent dentition.
- Orthodontically treated.

**Exclusion Criteria**
- Carious lower anterior teeth.
- Missing or extracted lower incisors.

Group I contains 25 males and 25 females who were given bonded canine to canine retainer in lower anterior teeth after orthodontic treatment whereas Group II consists of 25 males and 25 females who were given removable retainers. Lower anterior teeth from 3 to 3 of every subject in both the groups were examined both clinically and radiographically.

**RESULTS**

Table 1 showed the age and gender distribution among the different study groups i.e. Group I- Subjects with Lower Bonded Retainer (3-3) and Group II- Subjects with Removable Retainers.

Table 2 showed the frequency distribution of carious tooth in different study groups. In Group I majority of the subjects showed carious lesion relation to Central Incisors and Lateral Incisors with fewer incidences of caries in canines. However, the difference between genders is statistically insignificant (p=0.9012). Similarly in Group II there is more incidence for caries in Central and Lateral Incisors in comparison to canines with insignificant association with different genders (p=0.6666).

Table 3 showed that there was statistically insignificant relation between caries incidence for different teeth in two groups (p=0.6475).

<p>| Table 1: Age and gender distribution of subjects |</p>
<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Groups</th>
<th>Number of subjects</th>
<th>M (n)</th>
<th>F (n)</th>
</tr>
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<tr>
<td>15-25 years</td>
<td>Group I</td>
<td>Lower bonded retainer (3-3)</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>15-25 years</td>
<td>Group II</td>
<td>Removable retainer</td>
<td>25</td>
<td>25</td>
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</table>

<p>| Table 2: Frequency distribution of caries in different study groups |</p>
<table>
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<tr>
<th>Groups</th>
<th>Carious teeth</th>
<th>Number of subjects involved</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>Lower bonded retainer (3-3)</td>
<td>Central incisor</td>
<td>9 (36)</td>
<td>7 (28)</td>
</tr>
<tr>
<td>Group I</td>
<td>Lower bonded retainer (3-3)</td>
<td>Lateral incisor</td>
<td>8 (32)</td>
<td>8 (32)</td>
</tr>
<tr>
<td>Group I</td>
<td>Lower bonded retainer (3-3)</td>
<td>Canine</td>
<td>3 (12)</td>
<td>2 (8)</td>
</tr>
<tr>
<td>Group II</td>
<td>Removable retainer</td>
<td>Central incisor</td>
<td>4 (16)</td>
<td>5 (20)</td>
</tr>
<tr>
<td>Group II</td>
<td>Removable retainer</td>
<td>Lateral incisor</td>
<td>5 (20)</td>
<td>3 (12)</td>
</tr>
<tr>
<td>Group II</td>
<td>Removable retainer</td>
<td>Canine</td>
<td>2 (8)</td>
<td>3 (12)</td>
</tr>
</tbody>
</table>

<p>| Table 3: Inter-Group comparison for caries incidence |</p>
<table>
<thead>
<tr>
<th>Involved teeth</th>
<th>Group I</th>
<th>Group II</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower bonded retainer (3-3)</td>
<td>16</td>
<td>9</td>
<td>25</td>
</tr>
<tr>
<td>Removable retainer</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Central incisor</td>
<td>37</td>
<td>22</td>
<td>59</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>Canine</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 0.869, df = 2, \chi^2/df = 0.43, P(\chi^2 > 0.869) = 0.6475 \]
DISCUSSION

This study was done to find the prevalence of caries in lower anterior teeth bonded with fixed orthodontic retainer after one year of orthodontic treatment completion in Jammu population. The findings of our study showed that more number of subjects showed caries incidence for central and lateral incisors in Group I as compared to Group II, similar results were found by Axelsson et al. and Al-Kuwari HM et al. Axelson et al. concluded that two cases of enamel demineralization were found after two years of placing labial bonded retainers in the buccal segments. However contradictory results were found by Artun [11] who reported that no apparent damage was caused to the enamel after long-term usage of lingual fixed retainer. Furthermore, Artun et al. [13] found that instead of occasional accumulation of plaque and calculus along such retainers, caries was not a problem.

The findings of our study also suggest that there were no significant gender differences related with the frequency of carious lesions among teeth in both the study groups. Various studies in the past have found increased incidence of enamel decalcification around bracket bases with significant gender differences, however very sparse data regarding the gender predominance for caries around bonded retainers was available in the literature. [18]

In the present study, canines showed the least frequency for carious lesions in both the study groups, which were in accordance with the results of Al-Kuwari HM et al. [17]

Although, there is a difference between the frequency of carious lesions between the two study groups but the result is statistically insignificant. The limitations of our study are that oral hygiene index to measure plaque and calculus scores was not done. Further studies with inclusion of respective shortcomings and inclusion of more variables and maxillary arch should be conducted for more better and elaborated results.

CONCLUSION

It can be concluded that the mandibular central and lateral incisors in the experimental group had equal caries frequency compared to each other, but with higher frequency when compared to canines. Inspite of increased plaque accumulation around bonded orthodontic retainer, patient can prevent damage to their teeth by good oral hygiene with various oral hygiene products available.

REFERENCES

Clinical Evaluation of Periodontal Health of Abutment Teeth with Removable Partial Dentures Designed with and Without Clasps

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Abstract
Aim: The purpose of the study was to evaluate the effect of removable partial dentures designed with and without clasps on the periodontal health of the abutment teeth over a one-year worn period.

Materials and Methods: A total of 80 subjects wearing RPDs were selected for the study. The subjects were equally divided into 2 groups of 40 subjects each with the age ranging from 51-70 years. Group I consists of 20 males and 20 females wearing removable partial dentures with clasps in their design whereas Group II consists of 20 males and 20 females wearing removable partial dentures without clasps. Abutment teeth of each subject were assessed for plaque index (PI), calculus index (CI), bleeding on probing (BOP), probing depth (PD), gingival recession (GR), tooth mobility (TM). Level of significance was set at p<0.05.

Results: Results showed a highly significant association between bleeding on probing, increased Periodontal probing depth and Gingival recession with the subjects wearing RPDs designed with clasp. The significance was showed using Chi Square test with p value <0.05.

Conclusion: Patients wearing RPDs are at a greater risk of periodontal damage due to lack of ability and poor motivation to maintain proper oral hygiene. RPDs with clasp incorporated in their design leads to more accumulation of plaque in the areas covered by the dentures and below the clasp arms in abutment teeth, which increases gingival inflammation. Therefore, it is mandatory for dental professionals to educate and motivate patients for maintenance of their oral hygiene and periodic follow up.

Key words: Removable partial denture, Clasp, Periodontal health

INTRODUCTION
Removable partial dentures serve as an economical method for partially edentulous patients with good patient acceptability.[1]

Despite of wide acceptability, RPDs with different framework designs such as shape of the denture base, number and position of the clasps and occlusal rests are associated with increased plaque accumulation which leads to periodontal damage the development of caries.[2,14]

There is a particular concern in elderly patients in whom age related gingival recession favors the development of root caries. The etiology of root caries is related to Lactobacillus spp, and it was also found in a previous study that Lactobacillus was present in high numbers in patients wearing RPDs.[15]

Therefore, for a better prognosis and durability of the RPD, it is important to control the accumulation of dental plaque. As investigated by many researchers the effect of regular checkups on oral health and denture hygiene, proper motivation and instructions, all periodontal parameters
appeared with better results in patients who were going to receive an RPD.\textsuperscript{[16, 17]}

The aim of this study was clinical evaluation of periodontal health of abutment teeth with removable partial dentures designed with and without clasps in a one year worn duration.

**MATERIALS AND METHODS**

Out of a sample size of 167 subjects coming to the Dental OPD of District Hospital, Kathua, J&K, a total of 80 subjects wearing RPDs were selected for the study based on the inclusion criteria and willingness of the patients.

**Inclusion Criteria**
- Partially edentulous patients.
- Patients wearing RPDs from one year.

**Exclusion Criteria**
- Completely edentulous patients.
- Any systemic disease.

The subjects were equally divided into 2 groups of 40 subjects each with the age ranging from 51-70 years. Group I consists of 20 males and 20 females wearing removable partial dentures with clasps in their design whereas Group II consists of 20 males and 20 females wearing removable partial dentures without clasps. Abutment teeth of each subject were assessed for plaque index (PI), calculus index (CI), bleeding on probing (BOP), probing depth (PD), gingival recession (GR), tooth mobility (TM). Level of significance was set at $p<0.05$.

**RESULTS**

Table 1 showed the age distribution of the subjects. Table 2 showed a statistically highly significant association between bleeding on probing and removable partial dentures designed with clasps in them. 77.5% of the patients showed bleeding on probing wearing RPDs with clasp ($p=0.0001$).

Table 3 showed a statistically highly significant relationship between RPDs with clasp and increased Periodontal probing depth. 57.5% of the subjects wearing RPDs with clasp showed Periodontal probing depth of 2-3 mm followed by 35% of the subjects showing a depth more than 3 mm and 7.5% of the subjects showing a depth of <2 mm ($p=0.0000$).

Table 4 showed a statistically highly significant relationship of Gingival recession with RPDs designed with clasp. 72.5% of the subjects wearing RPDs with clasp showed Gingival recession whereas only 35% of the subjects in the group of patients wearing RPDs without clasp showed Gingival recession ($p=0.0008$).

**DISCUSSION**

The strong association between the uses of RPDs, biofilm accumulation, and caries, oral hygiene raised a concern, which should be incorporated into the treatment plan. The present study was conducted in 167 subjects coming to the Dental OPD of District Hospital, Kathua, J&K to find the association of Periodontal Health of Abutment Teeth with Removable Partial Dentures designed with and without clasps.

The findings of our study showed a strong association between the increased incidence of bleeding on probing in patients (77.5%) which is in accordance with the study done by Dula IJ et al.\textsuperscript{[18]} The studies done in the past stated that clasp retained design produced less torque on abutment teeth. wearing RPDs designed with clasp.\textsuperscript{[19,20]} According to various authors an ideal design for RPD is that which...
causes minimal stress and less damage to the abutment teeth and associated periodontium. The findings of our study showed a significant relationship between gingival recession and RPDs with clasp. The similar findings were found by studies done by Wright PS and Hellyer PH.[21]

A highly significant association of increase in probing depth was found in subjects with RPDs with clasp which is in accordance with the studies done by Amaral BA and Dula et al.[18,22] The limitations of our study is that various oral hygiene and gingival indices were not taken into consideration, in-depth analysis of grades of gingival recession could have done.

Therefore, it can be suggested that the RPD design should be as simple as possible, so that it causes minimal damage to the periodontium and makes the patient able to maintain his/her oral hygiene properly. Further education and motivation of the patient is compulsory at the time of delivery of prosthetic appliance. Maintenance therapy and regular follow up may be advocated in respective cases.

CONCLUSION

Patients wearing RPDs are at a greater risk of periodontal damage due to lack of ability and poor motivation to maintain proper oral hygiene. RPDs with clasp incorporated in their design leads to more accumulation of plaque in the areas covered by the dentures and below the clasp arms in abutment teeth, which increases gingival inflammation. Therefore, it is mandatory for dental professionals to educate and motivate patients for maintenance of their oral hygiene and periodic follow up.

REFERENCES


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Metastatic Melanoma to Stomach and Lungs

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Abstract

A case of metastatic melanoma is reported with a rare bronchoscopic and gastroscopic finding. An elderly gentleman presented with gradual onset productive cough, breathlessness, anorexia, and abdominal distension. Past history revealed curative amputation of melanoma in the right heel 5 years ago. A bronchoscopy followed by gastroscopy revealed multiple black pigmented polypoidal masses along the left lung and gastric antrum, and their biopsies confirmed them as melanomatous deposits which could have metastasized from the original tumor. Metastases occurring in the stomach after such a long time are a rare phenomenon and our patient had a fatal outcome. If appropriately followed up, early identification could have been possible, and there would be a chance of extend the mortality. We highlight the importance of following up these patients with necessary investigations on a long-term. We empathize gastric metastases can occur.

Key words: Bronchoscopy, Gastroscopy, Metastatic melanoma, Melanoma lungs, Melanoma stomach

INTRODUCTION

Simultaneous metastatic spread to the lungs and stomach are very rare presentation of malignant melanoma. Metastases to lungs are the most common presentations of cutaneous primary malignant melanoma and may manifest either as a typical multiple pulmonary nodules or as a solitary nodule, occurring in almost 70% of cases. Metastasis occurring in gastrointestinal tract (GIT) accounts for 2%, among which small bowel is the most common site followed by large intestine, stomach, and esophagus. Cutaneous primary is the most common source of metastases to the gastrointestinal tract, however, they can arise de novo.

We report a rare case in whom both gastroscopy and bronchoscopy simultaneously revealed metastatic melanoma to the lungs and antrum of the stomach.[¹-¹⁰]

CASE REPORT

A 73-year-old gentleman presented with gradual onset breathlessness, productive cough, anorexia, and weight loss since the past few months. Almost 10 years ago, he underwent surgical excision of right heel malignant melanoma followed by plantar flap cover and was lost to follow-up. The patient reports that he was symptom-free until about 10 days ago. Abdominal examination revealed a tender hard and nodular hepatomegaly with mild ascites, and auscultation of chest revealed left upper lobe rhonchi.

Baseline blood investigations revealed anemia, leukocytosis, elevated erythrocyte sedimentation rate, mild conjugated hyperbilirubinemia, and mild hepatic transaminase elevation. Chest X-ray revealed non-homogenous haziness along the left upper zone, and a subsequent computed tomography scan of the thorax and abdomen revealed well-defined mass lesions along the left lower lung zones with multiple metastatic deposits in the liver and left adrenal gland without any obvious enlargement of nodes, or biliary obstruction [Figure 1].

He underwent a bronchoscopy which revealed multiple black-pigmented nodular lesions measuring around 5 mm along the left upper lobe bronchus [Figure 2], from where multiple bits of tissue taken for biopsy. A gastroscopy done subsequently revealed similar ulcerated nodules with blackish slough along the gastric antrum and duodenum [Figure 3] and the tissue was sampled for biopsy.

Histopathological examination of the tissue taken from the nodules from both sites revealed submucosal dark pigmented deposits, containing melanin pigment-laden...
macrophages which confirmed them as melanomatous metastatic deposits [Figure 4].

A plan was done to give palliative chemotherapy as the disease was widespread but the general condition deteriorated in a short period of time and the patient died.

**DISCUSSION**

In general, whether primary or secondary, GIT melanoma is rare. Early patient mortality and some loss in follow-up also contribute to its rarity.

The usual survival rate of the patients with metastatic melanoma is <1 year. Involvement of gastric mucosa is less common than small bowel. Most often melanoma is asymptomatic unless a complication occurs such as obstruction, bleeding, and perforation.

Endoscopically viewed gastric metastasis is of three types. Metastatic nodules are the most common variety. The less common manifestations include sub-mucosal variety, presenting as an elevated nodule with ulcerations in the apex appearing as “bull’s eye,” and lastly mass lesions.

A case series from Tessier et al. has reviled an average interval time of 7.47 year between the primary and the metastatic disease. In their series, the metastatic spot was in the colon. Nonoperative patients had mean survival of 1 year and the operated candidates had survival rate of 37 and 21% at 1 and 5 year, respectively.

Another study of 30 patients from Patel et al. shows the average time of GI metastases was 52 months (4.9–139.8 months) for those with known primary. In their series, the site of metastasis was small and large bowel. Re-resection in some of their patients showed significant survival benefit.
Rest of the case reports shows the median survival of <1 year, and most of the patients had cutaneous primary. In comparison with above-mentioned studies, though our case also had survival of <1 year, the metastatic spot being stomach was unique.

To conclude that metastasis to the stomach is rare. Non-specific symptoms, late presentation and the yield of routine GI imaging are real diagnostic challenge. If gastric metastasis occur, fatal outcome seems inevitable with survival <1 year.  

CONCLUSION

Metastasis to the stomach is rare. Non-specific symptoms, late presentation and the yield of routine GI imaging are real diagnostic challenge. If gastric metastasis occur, fatal outcome seems inevitable with survival <1 year.

REFERENCES


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Adrenal Metastasis: A Rare Presentation of Metastatic Carcinoma of Thyroid

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Metastasis from differentiated thyroid malignancy is very rare. We present a 73-year-old lady, with oligometastatic thyroid cancer having adrenal metastasis. A 73-year-old lady presented with complaints of left sided loin discomfort for 3 months, with a history of decreased appetite and easy fatigability. She had no urologic symptoms. She had undergone right hemithyroidectomy 12 years back (benign histopathology). Physical examination revealed a fullness of the left hypochondrium and basic laboratory workup was normal. Ultrasonogram showed a left suprarenal mass. Contrast enhanced computed tomogram revealed a 11 × 9 mm well defined arterially enhancing lesion noted in the left suprarenal region with necrotic center [Figures 1 and 2]. Endocrinology workup was done and was confirmed as a non-functioning adrenal mass. The patient underwent open left adrenalectomy. The histopathology was metastatic well-differentiated thyroid carcinoma [Figure 3]. IHC was done which was thyroglobulin positive, confirming metastatic thyroid carcinoma [Figure 4]. General surgeon’s opinion was sought for evaluation of the thyroid primary. Ultrasonogram of the neck revealed a suspicious hypoechoic nodule in the right lobe of thyroid, and fine needle aspiration cytology confirmed malignancy. Left completion thyroidectomy was done, which showed residual infiltrating carcinoma multifocal type with features of papillary thyroid carcinoma. Post-operative I-131 study showed no tracer uptake in the thyroid or adrenal region. The patient is under follow-up for 1 year and is doing well.

Thyroid malignancy is a heterogeneous disease, and the incidence is rising.¹ The majority of thyroid malignancy is well differentiated, of which papillary type is 79%.² ¹0-year mortality in these tumors is <7%.³ Distant metastases are quite rare, seen in <2% of patients with papillary thyroid carcinoma and most commonly affect the lungs and bone.
For patients who present with metastases, 50% 10-year survival is reported.\textsuperscript{10} Metastasis from thyroid cancer to genitourinary organs is extremely rare. Only 11 cases of adrenal metastasis from thyroid have been reported in literature. Moreover, majority of the adrenal metastasis reported in literature are bilateral. In our case, we found a unilateral metastasis to the adrenal from thyroid.

**Points to Ponder**
- Metastasis from thyroid primary can present late, in our case 12 years after the thyroidectomy.
- Thyroid gland should be considered as a potential but rare source of metastases in a setting of the adrenal secondary.

**REFERENCES**


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