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Frequency of Variations in Axillary Artery Branches and its Surgical Importance

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Abstract

Introduction: Variation in the branching pattern of axillary artery is not uncommon. Awareness of variation of the axillary artery and its branching pattern is very much necessary for both radiologists and vascular surgeons. Knowledge about any variations in branching pattern is kept in mind during surgeries for lymph nodes in the axilla and pectoral region.

Materials and Methods: Axillary artery and its branches in 30 cadavers, on both right and the left sides of males and females, aged 26-70 years, through routine dissection on the axillary regions on both sides were taken for study.

Results: Most common variation found was the origin of posterior circumflex humeral artery from subscapular artery (30%) and duplex origin of subscapular artery from third part as usual and anomalous origin from second part along with thoracoacromial trunk (20%).

Conclusion: Accurate knowledge of the normal and variant arterial anatomy of the axillary artery is important for clinical procedures in this region. Branches of the axillary artery are used for flaps in reconstructive surgeries in the pectoral region. Orthopedic surgeons, also need to know about any variation in branching pattern while attempting to reduce old dislocations, especially when the artery is adherent to the articular capsule.

Key words: Axillary artery, Origin, Subscapular artery, Variation

INTRODUCTION

Variation in the origin, branching, course, branches of the axillary artery have received much importance of anatomists, surgeons, and particularly vascular surgeons. The axillary artery is a continuation of the subclavian artery, extending from the outer border of first rib to the lower border of teres major muscle. The axillary artery normally gives off one branch from its first part, i.e., superior thoracic, two branches from second part, i.e., lateral thoracic and thoracoacromial arteries, and three branches from third part, i.e., subscapular, anterior

circumflex humeral, and posterior circumflex humeral arteries. The subscapular artery divides into circumflex scapular and thoracodorsal arteries. It continues as the brachial artery, which divides into the radial and the ulnar artery in the forearm at the level of neck of the radius.¹⁻³ The variation in the branching pattern of axillary artery is not uncommon. Any deviation in the development of the vascular plexus of the limb bud may be responsible for variations in the branching pattern of the axillary artery. Normal anatomy and variations of the axillary artery have received great attention by radiologists and vascular surgeons. Knowledge about variations of axillary artery is used during surgeries for lymph nodes in the axilla and pectoral region.

The variation in the branching pattern observed considerably; the common known is the subscapular artery origination from a common trunk with the posterior circumflex humeral artery.^{4,5} The variations in the origin of the anterior circumflex humeral, posterior circumflex

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humeral are occasional, whereas anomalous origin is common for profunda brachial artery. The posterior circumflex humeral artery may arise from the profunda brachial artery, and pass back below the teres major to enter the quadrangular space.

There are considerable variations found in a number of branches that arose from the axillary artery: Two or more of usual branches may arise by a common trunk or named artery *viz.* deltoid, acromial, clavicular, or pectoral branch may arise directly from axillary artery.⁵

MATERIALS AND METHODS

In present study, the axillary artery and its branches in 30 cadavers, on right and the left sides of both males and females, aged 26-70 years, was studied through routine dissection for undergraduate medical students at Viswabharathi Medical College, Kurnool, Andhra Pradesh (state). The dissections were performed on the axillary regions on both sides, 60 axillary arteries in all. We have studied the total number of branches arising from three parts of axillary artery and variations in branching pattern which includes variation in the origin from anomalous location, along with other branches as a common trunk, duplex origin, and absence of origin found in main branches and sub-branches.

OBSERVATIONS AND RESULTS

In the present study, it was found that most common variation observed was the origin of posterior circumflex humeral artery from subscapular artery (30%) (Figure 1 and Table 1) and origin of subscapular artery from the third part as usual and anomalous origin of subscapular from the second part along with thoracoacromial trunk, i.e., duplex origin (20%) (Figure 2 and Table 2), least common were absence of superior thoracic artery. No significant correlation was observed in relation with nerves and preference of variation to right or left side.

DISCUSSION

Many reports of variations in the branching pattern of the axillary artery are available. According to Huelke's study, the subscapular artery arises from the first part of axillary artery in 0.6% cases, from the second part in 15.7% cases, and from the third part in 79.2% cases. Lateral thoracic artery arises from the first part of axillary artery in 10.7% cases, from the second part in 52.2% cases, and from the third part in 1.7% cases. The posterior



Figure 1: Anomalous origin of posterior circumflex humeral artery from subscapular artery



Figure 2: Thoracoacromial trunk and subscapular artery arising as common trunk from second part and accessory subscapular artery from third part (duplex origin)

Table 1: Percentage of variations of axillary artery branches

Branches	Percentage of variation	
	More common	Less common
Name of the main branch		
Superior thoracic		5
Lateral thoracic		5
Thoracoacromial		10
Subscapular	15	
Ant circumflex humeral		4
Post circumflex humeral	25	
Name of sub branch		
Circumflex scapular	15	
Thoracodorsal	15	

circumflex humeral artery arises from the third part of axillary artery in 67.5% cases and from the subscapular artery in 15.2% cases.⁶

De Garis and Swartley, in their study, found 5-11 branches arising directly from the axillary artery the most common number the 8. Heulke, in his study, found two to seven branches that arose from the axillary artery.⁷ In the present study, it was found 5-8 branches from an axillary artery (Table 3).

Pandey and Shukla studied about, thoracoacromial trunk variations particularly at the level of origin of its branches, more on the right side, and divided these variations into three groups. In the first group, the common trunk was absent but deltoacromial and clavipectoral sub-trunks arose directly from the second part of the axillary artery. In the second group, only one branch, i.e., a clavicular branch of from the second part of an axillary artery and the remaining three were arising from thoracoacromial trunk. In the third group, all classical branches of thoracoacromial trunk arose directly from the second part of the axillary artery, and the common trunk was absent. In 5% of the limbs, thoracoacromial trunk divided 1.2 cm after its origin into deltoacromial and clavipectoral sub-trunks, which were divided into deltoid and acromial, clavicular and pectoral branches, respectively.⁸ In the present study, it was found the pattern of division of thoracoacromial trunk according to the first group in the majority of cases.

Saeed *et al.* has reported a common subscapular-circumflex humeral trunk from the third part of axillary artery, which divided into subscapular, anterior circumflex humeral, and posterior circumflex humeral arteries in 3.8% of cases.⁹ Ramesh *et al.* also reported a common trunk from the third part of the left axillary artery, which gave origin to subscapular, anterior circumflex humeral, posterior circumflex humeral, profunda brachial, and ulnar collateral arteries.⁴ Vijaya *et al.* reported a common trunk from the third part of the axillary artery, which gave origin to

anterior circumflex humeral, posterior circumflex humeral, subscapular, radial collateral, middle collateral, and superior ulnar collateral arteries with absent profunda brachial artery.¹⁰ Cavdar *et al.* mentioned the third part of axillary artery variation as its division into superficial and deep brachial arteries: The superficial brachial artery was divided into radial and ulnar arteries in cubital fossa; and deep brachial artery divided into anterior circumflex humeral, posterior circumflex humeral, subscapular, and profunda brachial arteries, so it may be similar to common trunk as it was found in present study.¹¹ Furthermore in current study, it was found a common trunk from the third part of axillary artery in 20% of the limbs; Bhargava considered this common trunk as an original axillary brachial trunk, which failed to develop in early fetal life and became obstructed. Subsequently, an apparent axillary brachial trunk developed for supplying the distal part of the limb. This was probably a vasa aberration, which sometimes arose from the brachial artery. This type of arrangement would give a good blood supply to the limb through profunda brachial if axillary artery or brachial artery was connected distally to the origin of this common trunk.

Daimi *et al.* found duplex origin in the posterior circumflex humeral arteries arising from the third part of the axillary artery as two trunks: One artery continued laterally together with axillary nerve and appeared in the quadrangular space; the other one passed medially piercing teres minor muscle and appeared on the dorsal surface of scapula.¹² We found posterior circumflex humeral arteries arising from subscapular artery in 25% of the limbs: In the present study, it was found the origin of posterior circumflex humeral artery from subscapular artery in 25% of cases and common trunk of subscapular and thoracoacromial trunk from the second part of axillary artery in 15% of cases (Figures 1 and 2, Tables 1 and 2).

Table 2: Types of variations and its distribution-axillary artery branches

Type of variation	Name of artery	Percentage of variation
Common stem	Lateral thoracic, thoracoacromial and subscapular	10
Duplex origin	Subscapular	15
Absence	Superior thoracic	5
Abnormal site of origin	Post circumflex humeral	25

Table 3: Average number of branches arising from axillary artery

Number of branches	Author's name
6-11	DeGaris and Swartley
4-7	Heulke
5-8	Present study

Any deviation in the embryonic development of the vascular plexus of the upper limb bud may cause variations in the branching pattern of the axillary artery. The manner of deviation may be an arrest at any stage of development of vessels followed by regression, retention, or reappearance, thus leading to variations in the arterial origin and course of major upper limb vessels. Anomalous branching pattern may represent persisting branches of the capillary plexus of the developing limb buds and their unusual course, it may be a cause for concern to the radiologists and vascular surgeons, and may lead to complications in surgeries that involve the axilla and pectoral regions.

Knowledge of branching pattern of axillary artery is necessary during antegrade cerebral perfusion in aortic surgery, while treating the axillary artery thrombosis, using the medial arm skin flap, reconstructing the axillary artery

after trauma, treating axillary artery hematoma and brachial plexus palsy, considering the branches of the axillary artery for the use of microvascular graft to replace the damaged arteries, creating the axillary-coronary bypass shunt in high-risk patients, catheterizing or cannulating the axillary artery for several procedures, during surgical intervention of fractured upper end of humerus, and shoulder dislocations. Therefore, both the normal and abnormal anatomies of the axillary artery should be well-known for accurate diagnostic interpretation and surgical intervention.

CONCLUSION

Common variations need to be observed in axillary artery dissection are i) origin of posterior circumflex humeral from subscapular artery in 25% of limbs, ii) subscapular artery arising from the second part along with thoracoacromial trunk (15%) iii) accessory subscapular artery from the third part, i.e., duplex origin (15%).

Any clinical procedures in pectoral and axillary regions require accurate knowledge of the normal and variant arterial anatomy of the axillary artery.¹¹ The importance of axillary artery and its branches lies in the usage for coronary bypass and flaps in reconstructive surgeries. All vascular surgeons need thorough knowledge of variation in branching pattern while attempting to reduce old

dislocations, especially when the artery is adherent to the articular capsule.^{4,5,13,14}

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Phosphide Poisoning in Children in Tertiary Care Hospital of South India: A Retrospective Study

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Abstract

Background: Phosphide poisoning is among the most lethal poisons with high reported mortality. Incidence varies in different parts of the world and parts of the country. There few reports in pediatric age group.

Materials and Methods: A 33 patients below 18 years of age admitted to tertiary child care hospital in south India from January 1, 2013 to June 30, 2015 were retrospectively analyzed.

Results: The 33 were found to have acute phosphide poisoning and accounted for 9.93% of all poisonings and 0.5% of all admissions to a pediatric emergency. It was the fifth most common cause of acute poisoning in children. Males were only 10 out of 33 phosphide poisoning. 54.5% of all phosphide poisoning was observed in more than 14 years of age, followed by 10-14 years and 5-9 years age group with 21% in each group. The peak in poisoning was observed in winter and spring. Children were treated with gastric lavage with 1:1000 dilution potassium permanganate followed by sodium bicarbonate, activated charcoal, magnesium sulfate, inotropic support, and atropine whenever bradycardia and decreased plasma pseudocholinesterase. One case left against medical advice, but he had improved clinically and laboratory wise at the time of leaving. Only one death occurred out of 33 patients (3.3% mortality).

Conclusion: Phosphide is the fifth most common cause of poisoning in <18 years of age. Multipronged approach will certainly reduce mortality. The plasma pseudocholinesterase is to be measured, and low levels of the enzyme are the indication for using atropine and pralidoxime. Randomized control trials are necessary to substantiate our observation.

Key words: Atropine, Pseudocholinesterase, Organophosphorus, Zinc phosphide

INTRODUCTION

The phosphides, aluminum phosphide (AIP) in particular, which are used as rodenticides and insecticides are becoming an agent of choice for suicides. During the last 10 years, AIP has gained notoriety as an effective suicidal agent and has resulted in thousands of deaths in last two decades.^{1,2} AIP, solid fumigant, was declared as an ideal fumigant pesticide in 1973 for its effectiveness, easy to use and low cost properties. Phosphine gas (PH₃) is liberated from phosphide diffuses uniformly throughout the stored grains, leaving non-toxic

residues in the form of phosphite and hypophosphite of aluminum without affecting the food value of grains.³ Self-poisoning with paraquat and AIP ingestion have reported fatality in excess of 70%, although earlier studies report higher mortality (70-100%).^{4,6} Mortality is higher when more than two tablets are consumed, and none survive with three or more tablets ingestion.⁶ AIP has also emerged as one of the most common poisonings in children, with a mortality ranging from 30 to 100%.⁷⁻⁹ Studies suggest that phosphides and organophosphates (OP) are commonly implicated in fatal poisonings in the northern and southern part of India, respectively.^{10,11}

In one study of 2039 autopsies, 208 cases (10.02%) of death due to poisoning and AIP leads the lists of most killer poisons and accounts for 35.1% of deaths.³ However, only one study has been done in north India on phosphide poisoning outcome among children aged 12 years and younger.¹²

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In the view of its public health concern, non-availability of specific antidote and low survival rate and no similar study in geographically different south India, this study was undertaken to study acute phosphide poisoning and mortality in tertiary child care hospital from south India.

MATERIALS AND METHODS

This is a retrospective study of all the children aged below 18 years admitted with a diagnosis of acute poisonings, Vanivilas Women and Children's Hospital, tertiary health care center under Bangalore Medical College and Research Institute, Bengaluru. Data was collected for the period from January 1, 2013 to June 30, 2015 from the medico-legal registry, inpatient records, and daily duty reports. Forensic reports of gastric aspirates and post-mortem findings were not analyzed. Specially designed data collection performa was used for getting information on demographic profile, name, quantity nature of poison, route of exposure, information regarding first aid received else, signs and symptoms, investigations done, treatment given, complications, treatment outcomes, and events of mortality and the reasons for the mortality.

RESULTS

Three hundred and thirty two children were admitted and treated for acute poisoning in a pediatric emergency. The poisoning contributed for 5.3% of total admissions (332 of 6199 admissions) during the period of January 2013-June 2015. 33 children of 332 children were due to phosphide ingestion. The phosphides accounted for 9.93% of all poisonings and 0.5% of all admissions to a pediatric emergency. It was the fifth most common cause of acute poisoning in children. First four were in the order; kerosene, snake bites and scorpion stings, OP compounds, and drugs (Figure 1). AIP accounted for 15 and zinc phosphide for 18 of phosphide poisoning. Males were only 10 (30%) out of 33 phosphide poisoning (Figure 2). This is in contrast to all major groups of poisoning except kerosene where males dominated the female. Incidence of phosphide poisoning increased with age. 54.5% of all phosphide poisoning was observed in more than 14 years of age, followed by 10-14 years and 5-9 years age group with 21% in each group. Only one case was observed in <1 year of age and 1-4 years age group each (Figure 3).

Seasonal Variation

Maximum number of phosphide poisoning cases was observed during winter season followed by spring season (Figure 4). This is in contrast to the incidence of all-cause admissions due to poisonings. A number of admissions due to all causes were maximum during summer (31%)

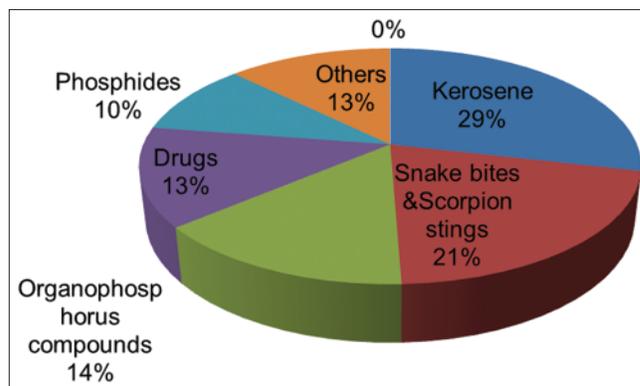


Figure 1: Distribution of various types of acute poisoning in children

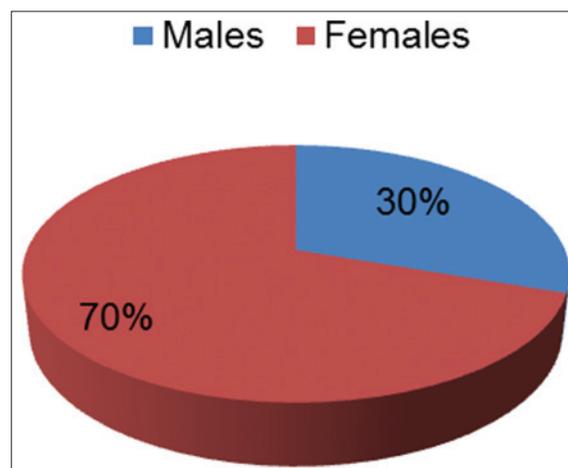


Figure 2: Gender distribution in acute phosphide poisoning

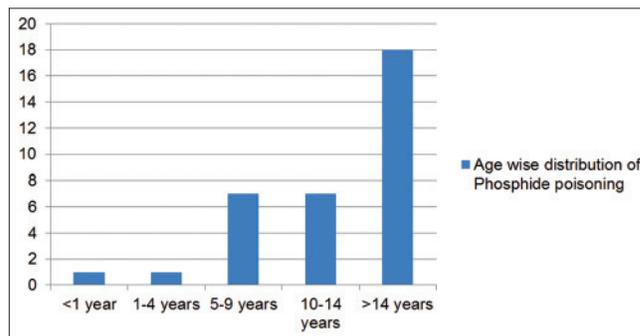


Figure 3: Age wise distribution of phosphide poisoning

followed by the rainy season. There was no correlation in different months of the year, but peaking observed was correlated with seasonal variation when 2 years values were merged to calculate occurrence (Figure 5).

Symptoms

Gastrointestinal symptoms were present in 22 (66%), central nervous system symptoms in 6 (18.1%), respiratory symptoms in 6 (18%), hypotension in 5 (15.1%), and asymptomatic in one. Overall, more than the system was involved in seven patients.

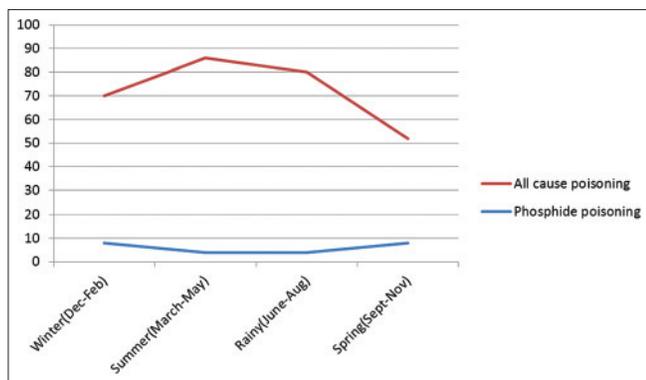


Figure 4: Season wise distribution of phosphide poisoning

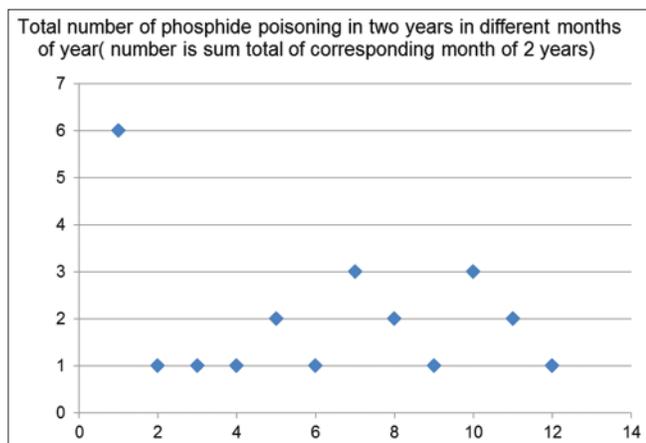


Figure 5: Scattered diagram showing frequency of occurrence in different months

Toxic Dose

Exact dose phosphide ingested was available only in four of our study patients. Rest were either unknown or not given the information. Lowest consumed dose was 1 g, and highest was 5 g. One child who had consumed 3 g of AIP presented with drowsiness and hypotension. He did not respond to treatment and succumbed.

Treatment

The gastric lavage was carried out using normal saline, 1:1000 dilution potassium permanganate followed by sodium bicarbonate lavage, activated charcoal for gastrointestinal contamination. Intravenous fluids, inotropic support, vitamin K, vitamin C, and magnesium sulfate 100 mg/kg, 6th hourly was administered up to 4 days depending on the severity of symptoms. The children were monitored for vital parameters, renal function tests, and liver functions tests wherever required. One patient aged 15 years who stable with supportive treatment, normal total counts, and liver functions tests started gasping at about 24 h of ingestion with low volume pulses, prolonged capillary refill time, bradycardia (heart rate - 32/min), and saturation of 64%. Pupils were 3 mm bilaterally and reactive to light. There were a lot of bronchial secretions. Cardiopulmonary resuscitation was

done, and the patient was mechanically ventilated along with inotropic support using dopamine at 10 µg/kg/min. The patient was administered with atropine 0.05 mg/kg bolus followed by infusion at 0.05 µg/kg/h to maintain in optimal atropinization. Injection pralidoxime was given at a dose of 30 mg/kg intravenously. The plasma pseudocholinesterase (PCHE) was found to be low with 3344 U/L (normal value is 5385-12920 U/L). Symptoms dramatically improved within 2 h. Atropine was continued until the elevation of pseudocholinesterase was observed and stopped.

Mortality

The acute phosphide poisoning contributed for 1 out of 7 deaths due to all poisonings. Hence, the mortality rate of phosphide poisonings in our institute is 2.1%, a figure not different from the mortality due to all causes poisonings. One out of 33 acute phosphide poisoning admissions died (3% mortality). The 8-year-old male died of accidental consumption of AIP. He had consumed about 3 g of AIP. The presentation was vomiting, altered sensorium, and hypotension after 2 h of consumption. The patient had been received vitamin K, magnesium sulfate, sodium bicarbonate, intravenous fluids, inotropic, and mechanical ventilator support. Comorbid conditions: Depression, mood disorder, adjustment disorder, and deliberate self-harm were the predominant diagnoses in those who were older than 10 years.

DISCUSSION

Phosphide compounds are available as zinc phosphide (Zn_3P_2), AIP, magnesium phosphide (Mg_3P_2), and calcium phosphide (Ca_3P_2). Among these, AIP and Zn_3P_2 are encountered in our study. Zn_3P_2 was seen 18 and AIP in 15 out of 33 phosphide poisoning. Zn_3P_2 has been reported to have lower human mortality.⁶ The acute phosphide poisoning is either by ingestion or inhalation.^{13,14}

Burden

Very much insurgence of phosphides in the open market during cropping and storage seasons, although poisoning can occur in any season of the year, may explain increased incidence of acute poisoning during winter and spring. The phosphides are second only to OP compounds in our study and observation is inconsistent with in other studies.^{10,11}

Toxic Dose

The exact dose of phosphide ingested was available only in four of our study patients with an average of 3.5 g. Rest were either unknown or not given the information. Lowest consumed dose was 1 g, and highest was 5 g. One child who had consumed 3 g of AIP presented with drowsiness and hypotension and did not respond to treatment and died. The toxic dose reported in the literature is >1.5, 3 g, and 20 mg/kg for AIP, and 4-5 g for Zn_3P_2 .^{12,15-17} The higher dose in our study

could be fallacious and possibility of inappropriate history regarding the amount of phosphide ingested.

Gender Distribution

Females:males in our study was 7:3 in contrast to reported male:female ratio being 2.1:1 in one north Indian study. The incidence of poisoning was highest in the age group of 21-25 years in that particular study.¹⁸ Male predominance (63%) was reported in a study done exclusively in children below 12 years of age.¹² Our study population was <18 years and geographically different, i.e. south India. Accessibility for females in grain storage process could be the reasons. Clinical Features

The gastrointestinal symptoms were present in 22 (66%), central nervous system symptoms in 6 (18.1%), respiratory symptoms in 6 (18%), hypotension in 5 (15.1%), and asymptomatic in one. Over all, more than one system were involved in seven children of the study group. The hypotension and metabolic acidosis were less than reported. Nausea was present in 79.4%, vomiting in 76.5%, abdominal pain in 31.4%, and metabolic acidosis in 41.1% in a study of 102 patients with AIP poisoning in the age of 28.5 ± 12.4 years.¹⁹ In one more study done exclusively in children, hypotension was observed in 46.7%, respiratory system involvement in 26%, and central nervous system involvement in 12%.¹²

Mortality

One child who had consumed 3 g of AIP died. Mortality of 3.3% in our study is much lower than reported 46.67% where in 14 of 30 children with phosphide.¹² Lethal dose in our died child is inconsistent with observations made in which no survivors had consumed more tablets (2.2 ± 2.4).¹⁹ Combination of treatment modalities used rather than individual treatment regimens described fact that less toxic zinc phosphide was observed in 18 of 33 cases, and possibly less amount of phosphide ingested could be reason for low mortality in our study.

Mechanism

PH₃, active form of phosphide, is released when phosphide comes in contact with acid, and it is the culprit for clinical features phosphide poisoning.⁷ There is conflicting evidence on the occurrence of magnesium disturbances and its role.^{13,14} The most of deaths, mostly due to cardiac complications, occur within 24 h of ingestion. Delayed deaths could occur when adult respiratory distress syndrome (ARDS) supervenes. Circulatory collapse, ARDS, myocardial dysfunction, metabolic acidosis, acute renal failure, disseminated intravascular coagulation, and hepatic necrosis are other reasons for mortality. Varying degree of congestion, edema and leukocyte infiltration suggesting cellular hypoxia in AIP poisoning, notably in lungs, kidneys and adrenals,

have been documented.²⁰ Decreased PCHE in the absence of liver cell damage is another effect of PH₃. These children mimic OP compounds in manifestations.²¹ Low PCHE levels correlate with outcome in OP poisoning.^{22,23} This relation of PCHE with mortality in phosphide poisoning needs to be evaluated by randomized control trials.

Treatment

The principle is same for all phosphides. The gastric lavage with potassium permanganate (KMnO₄) activated charcoal + sorbitol solution. KMnO₄ (1:1000 solution) oxidizes PH₃ in the stomach to phosphate, and reduces the amount of PH₃.²⁴ Other modalities are intra-aortic balloon pump, trimetazidine and magnesium sulfate, vitamin C + methylene blue, hyperbaric oxygen therapy, and supportive treatment.²⁵⁻²⁸ Survival rate of 42% with extensive gastric lavage with coconut oil and sodium bicarbonate solution with simultaneous aspiration and supportive treatment has been reported.²⁹ Mg²⁺ - carrying nanoparticle and sodium bicarbonate combination, N-acetyl cysteine (NAC) improved survival time animal experiments.^{30,31} Further studies showed improved out come with NAC and oral sweet almond oil.^{32,33} The magnesium sulfate improves the outcome in humans by reducing life-threatening cardiac arrhythmias and decreasing apoptosis in neuronal tissue as a result of decreased calcium influx.¹² Vitamin C, magnesium, and NAC, and glutathione act against oxidative stress. The phosphide poisoning with reduced PCHE responds very well to atropine and pralidoxime as evidenced from animal study and our observation.²¹ Decreased PCHE could be the culprit for mimicking OP poisoning. The bradycardia has also been attributed to transient vagotonia that responds to atropine.³⁴ The phosphides shall be considered for differential diagnosis in OP poisoning. Recently, boric acid has been proposed as a non-toxic and efficient trapping agent and an antidote for PH₃ poisoning by investigating the chemical reaction between them.³⁵

Limitations of the Study

The limitation of our study includes the retrospective nature of data collection, and relatively small sample size, no availability of exact amount of phosphide ingestion. The zinc phosphide which is relatively less toxic than AIP may be another factor for low mortality in our study population. Multiple modalities of treatment were used in management and were not compared between one another.

CONCLUSIONS

The Proper antidote for acute phosphide poisoning is still unavailable although boric acid has been proposed as an antidote for PH₃. The combination of treatment modalities would help reduce mortality rather than one modality. Treatment with atropine and pralidoxime when the

presentation is like OP poisoning supported by decreased PCHE, in addition to gastrointestinal decontamination, vitamin C, magnesium, NAC, and supportive therapy, may be an effective treatment. Measurement of PCHE in all case of phosphide poisoning is recommended. Further studies are required on effects atropine and pralidoxime in acute phosphide poisoning in humans.

LEARNING POINTS

1. Phosphide poisoning is the fifth most common cause of acute poisoning in children peaking during adolescence
2. Phosphide peaks during winter and spring
3. Phosphide can mimic organophosphorus poisoning
4. PCHE levels are to be measured in ALP poisoning
5. Combination of various treatment options reduces mortality
6. Treatment with atropine and pralidoxime shall be considered in every case of bradycardia, hypotension, increased secretions following ALP poisoning even in the absence of PCHE estimation.

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Effect of Nebulized Lignocaine for the Treatment of Post-Operative Sore Throat

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Abstract

Background: A sore throat is a side effect of general anesthesia with an endotracheal tube. The reported incidence is about 15-50% of patients after tracheal intubation and about 10-30% even with supraglottic airway devices. Several methods are used pre-operatively to reduce the incidence of post-operative sore throat (POST) with variable results.

Materials and Methods: We studied 50 patients prospectively to determine the effectiveness of nebulized lignocaine for the treatment of POST compared to placebo.

Results: Significant number of patients (23/25) reported a reduction in severity of POST in those treated with nebulized lignocaine compared to the control group (9/25) ($P = 0.001$).

Conclusion: Nebulized lignocaine can be used as a safe and effective treatment for relief of POST resulting from endotracheal intubation. Selection of appropriate patients is important for preventing untoward incidents that may result from the treatment.

Keywords: Complications, Equipment, Intubation, Sore throat

INTRODUCTION

Post-operative sore throat (POST) is a common complaint in the post-operative period after tracheal intubation and is a cause of patient dissatisfaction.¹ POST causes considerable patient discomfort and in certain surgical procedures may lead to post-operative surgical complication. After tracheal intubation, the incidence of the sore throat varies from 14.4% to 50%.²⁻⁹

The post-operative throat symptoms manifest as pain, dysphagia, and hoarseness after the use of tracheal intubation.

The incidence of the sore throat was higher when the cuffed endotracheal tubes were lubricated with lignocaine

ointments, as opposed to a water-soluble jelly or no lubricant at all.¹⁰ However, the incidence was as high as 90% when the uncuffed tubes were lubricated with 4% lignocaine jelly, and the severity of the sore throat in these patients was significantly greater.

A comparison between intubation with dry tubes or a tube lubricated with jelly containing 1% cinchocaine suggests that the use of lubricants containing a local anesthetic may be beneficial. Of the 248 patients in that study, 39% who were intubated with a dry tube complained of sore throat on the first post-operative day compared with 24% who were intubated with a lubricated tube, which is a significant difference. The incidence decreased rapidly in both groups after the first post-operative day. A further comparison was made in 60 patients between lubrication of the tube with jelly containing cinchocaine and lubrication with the same jelly without cinchocaine.⁹ The incidence of sore throat was 38% in the non-cinchocaine group versus 25% in the cinchocaine group, which was not statistically significant.

The effect of the application of laryngotracheal lignocaine spray on POST has also been investigated.⁴ In the study group, after induction of anesthesia and 2 min of mask

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ventilation, the lignocaine spray was applied to the epiglottis, vocal cords, and trachea. Mask ventilation was then continued for a further 2 min prior to intubation. Subjects in the control group were intubated after 4 min of ventilation, with no application of spray. The incidence of the sore throat was 29.2% in the study group and 19.6% in the control group. Although this difference was not statistically significant, it was concluded that the application of lignocaine spray could not be recommended for routine use; it was further suggested that the lignocaine may be irritating or damaging to the tracheal mucosa. However, it should be noted that subjects in the study group underwent two laryngoscopies whereas those in the control group had only one.

Lubrication of endotracheal tube with 1% hydrocortisone was also found to increase the incidence of the sore throat from 50% to 90% when compared with KY jelly.⁸ There is no study therefore that categorically demonstrates that the use of lubricating jelly containing a local anesthetic is beneficial in the reduction of POST after tracheal intubation. The application of lignocaine spray before intubation appears to increase the incidence of the sore throat, as a result of either mucosal irritation or repeated laryngoscopy.

The role of suxamethonium in the etiology of POST is unclear. It has been suggested that suxamethonium, which is known to cause post-operative skeletal muscle pain, could also lead to pain in the striated pharyngeal muscles, causing sore throat. In a study of 83 women undergoing dilatation and curettage who did not undergo tracheal intubation, the effect of administration of suxamethonium was examined.¹¹ Patients who received suxamethonium, either as a bolus or by infusion, had a significantly higher incidence of the sore throat, hoarseness, and myalgia 24-30 h post-operatively. Precurarization did not have any effect on these symptoms despite significantly reducing the incidence of muscle fasciculation. Although the patients did not undergo intubation, did not have oral airways inserted and were not suctioned, 20 patients had a nasopharyngeal airway inserted.

The highest incidence of airway use occurred in those given a bolus of suxamethonium and the incidence of the sore throat in these patients was higher than in the other groups. However, it could not be confirmed statistically that the use of the nasopharyngeal airways contributed to the higher incidence of the sore throat in patients receiving suxamethonium. These findings have not been confirmed by other investigators. Because airway management was standardized in this study, it would appear that suxamethonium does not increase the incidence of POST.

There is increasing evidence that it may be advantageous to adopt an alternative technique of laryngeal mask airway (LMA) insertion, inflation of the LMA cuff before insertion, to reduce pharyngeal trauma and POST. A high success rate was obtained when the LMA was inserted already fully inflated, but it is possible that partial inflation may have similar benefits. Lubrication of the LMA with gels containing a local anesthetic before insertion did not reduce the incidence of the sore throat;¹¹ the use of saline or KY jelly is preferred. However, the issue of whether the limitation of intracuff pressure is beneficial in reducing sore throat remains unresolved. Reduction of intracuff pressure is certainly possible without adversely affecting spontaneous tidal ventilation, but it may be necessary to maintain the pressure above a certain level to protect the larynx from contamination with oropharyngeal secretions.¹²

In summary, the use of smaller tracheal tubes with cuffs that have a small area of contact with the tracheal mucosa will reduce the incidence of POST. Careful control of intracuff pressure may be beneficial even for short-term intubation, and consideration should be given to using either the anesthetic gas mixture or saline to inflate the cuff. Lubricants containing local anesthetic agents are not useful and may actually increase sore throat incidence.

Numerous methods have been tried to prevent POST with variable results. Prophylactic administration of lignocaine in various forms has been tried for the prevention of POST with conflicting results.

In our study, we aim to study the safety and efficacy of nebulized lignocaine 2% post-operatively for POST.

MATERIALS AND METHODS

It was a prospective double-blinded study and was conducted over a period of 3 months, from March to June 2008.

Approval was obtained from the Ethical Review Committee of our institution.

The age, sex, weight and "American Society of Anesthesiologists (ASA)" physical statuses of the patients were recorded on a standardized form.

In this study, after taking prior informed consent and proper counseling, 50 patients aged 20-60 years (ASA I and II) with POST were allocated randomly to two groups (C = control/T = test) 25 in each group by simple randomization using computer generated numbers in the post-anesthesia care unit.

T-group: Received 5 ml (100 mg) of 2% lignocaine as nebulization with oxygen;

C-group: Received 5 ml normal saline nebulization with oxygen.

Patients were required:

- To maintain head end elevation for at least 30 min post-treatment
- Refrain from eating or drinking during that period
- Educated to “turn over” if vomiting occurs or to spit out the secretions.

They were evaluated for severity of cough at 0 h (i.e. before treatment), 1st and 2nd h (after treatment) by using the Edmonton symptom assessment system index.¹³

POST was graded on a four-point scale (0-3):

- No sore throat.
- Mild sore throat.
- Moderate sore throat.
- Severe sore throat.

Data Analysis

The statistical analysis was done using Student's *t*-test.

RESULTS

Improvement in the severity of POST was observed after the lignocaine nebulization in 23/25 patients as compared with the control group in which only 9/25 patients reported relief ($P = 0.001$) [Table 1].

The demographic data of both the groups was comparable. The treatment was well tolerated with only transient side effects like oropharyngeal numbness, bitter taste or risk of aspiration which was prevented by selecting fasting patients (elective surgeries), keeping the patients propped up and NPO for 30 min post-treatment.

DISCUSSION

Prophylaxis for POST with intravenous (IV) lignocaine, lignocaine jelly or spray, pre-operative gargles with licorice, or ketamine or IV steroids increase cost and side effects with uncertain effects. Supraglottic airway devices are sometimes not indicated in obese or non-fasting patients.

Therapeutic modalities also have their adverse effect profiles like antihistamines (sedation and dry secretions, paradoxically worsening the cough), phenothiazines (dystonic reactions, sedation, and tardive dyskinesia), opioids

Table 1: Comparison of test and control group symptoms

Group	N	Age (mean±SD)	Male: Female	Symptom assessment system index		
				Score at 0 h	Score at 1 h	Score at 2 h
T-group	25	43±6.28	14:11	50	5	2
C-group	25	46±5.63	15:10	49	35	34
P value				0.1815	0.001	0.001

SD: Standard deviation

(respiratory depression), and steroids (hyperglycemia, gastric ulcers, impaired healing, immunosuppression).

Nebulized lignocaine is easily available, easily administered, cost effective, acts immediately with short duration of action and minimal systemic effects, less side effects, and no long-term residual effects.

CONCLUSION

POST often leads to patient dissatisfaction.¹ It may lead to bleeding. Many prophylactic medications such as lignocaine jelly and hydrocortisone cream were actually found to increase the incidence of POST.⁸ Therapeutic lignocaine nebulization was well tolerated by the patients and provides immediate relief, except for transient numbness of oropharynx and bitter taste in the mouth.

Our study establishes the effectiveness of lignocaine nebulization for the treatment of POST resulting from endotracheal intubation.

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Sexual Dimorphism of Human Hip Bone with Respect to Chilotic Index in North Karnataka Region

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Abstract

Introduction: The hip bone is an ideal bone for sex determination because it reflects the general differences between the two sexes and it also shows a special adaptation of female hip bone for childbearing. For sexing of human skeleton opinion of the experts regards the hip bone as providing the highest accuracy levels. Traditional non-metric methods such as visual examination of bone morphology for determination of sex, depends entirely on the ability and experience of an expert. It is almost impossible to assign sex with 100% certainty in all cases unless the whole skeleton is available.

The purpose of Study: The present study is done to determine the sexual dimorphism of human hip bone with respect to chilotic line and chilotic index (CI).

Materials and Methods: In the present study about 50 dry adult human hip bones of unknown sex are studied, the sex of the bones were determined by some non-metrical parameters, about 31 were classified as male and 19 were classified as females. From these two groups, the bones were further studied for metrical parameters which involved measurement of the pelvic segment and the sacral segment of the chilotic line, and the CI was also calculated.

Results: From the present study, it is revealed that the pelvic segment of the chilotic line is greater in females than in male hip bones and vice versa. The mean value of CI in males is found to be 117.86 and that in female hip bones is found to be 79.88. From the present study, it is also seen that the bones having CI <85 are classified as female hip bones and bones having CI >105 are classified as male hip bones.

Conclusion: From this study, it is concluded that the total chilotic line in males is longer than in females.

Key words: Chilotic index, Chilotic line, Pelvic segment, Sacral segment

INTRODUCTION

Hip bone, also known as the innominate is large, irregular in shape, centrally constricted bone which is expanded above and below. The lateral surface of hip bone has a deep, cup-shaped acetabulum, articulating with the femoral head, antero-inferior to which there is the large obturator foramen, which is oval or triangular in shape. In front bone articulates with its other side fellow to form the pelvic girdle. Each bone has three parts named as ilium,

ischium, and pubis which are connected by cartilage and are united as one bone in adults. The ilium includes the upper acetabulum and expanded area above it; the ischium includes the lower acetabulum and bone posteroinferior to it; the pubis forms the anterior acetabulum, separating the ilium from ischium, and the anterior median region where the pubes meet. Determining the sex of the skeletal remains is very important part in any forensic examination or anthropological studies. Therefore, the study of sexual dimorphism of a bone in the group of population is a matter of interest not only for an anatomist but for a forensic expert and an anthropologist. The hip bone is an ideal bone for sex determination because it reflects the general differences between the two sexes providing high accuracy levels of sex determination and it also shows a special adaptation of female hip bone for childbearing.¹ An awareness of the average dimensions of the hip bone in a given population also helps in early detection of

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disputed sex by forensic the forensic experts. For sexing of human skeleton opinion of the experts regards the hip bone as providing the highest accuracy levels.² Traditional non-metric methods such as visual examination of bone morphology for determination of sex, depends entirely on the ability and experience of expert. It is almost impossible to assign sex with 100% certainty in all cases unless the whole skeleton is available.³ The introduction of metric method has provided the simplicity and accuracy to determine the sex of skeletal remains. Techniques requiring the measurements of diameters, circumferences or cross sectional areas of tubular bones may provide the needed means for sexing fragmentary remains.⁴ Several studies of metrical characteristics in various pelvic regions have been made, leading to the production of various indices. The ilium has received particular attention, e.g. one index compares the pelvic and sacroiliac parts of the bone. A line is extended back from the iliopectineal eminence to the nearest point on the anterior auricular margin and thence to the iliac crest. The auricular point divides this chilotic line into anterior (pelvic) and posterior (sacral) segments, each expressed as a percentage of the other. Chilotic indices display reciprocal values in the sexes: The pelvic part of the chilotic line is predominant in females, and the sacral part in males.

Morphometric measurements done on the right and left sided hip bone indicates that there is bilateral asymmetry of hip bone.⁵⁻⁷ Racial differences in Chinese, Thais, and Nigerians and other populations have been compared.^{8,9} Various metrical parameters for hip bone have also been evolved. In spite of this not much work has been done in the Indian population. Therefore, the need for the present study to be carried out was felt. The present study will hence provide valuable parameters in the hip bones of the Indian population which would help the forensic experts, orthopedicians and anthropologists. The main objective of the present study is to do the morphometry of 50 adult dry human hip bones (25 right and 25 left) in the Indian population to evaluate various parameters of the hip bone.

MATERIALS AND METHODS

A total of 50 adult human hip bones were collected. The samples for the study were collected randomly independent of the sex. The hip bones were collected from the bone bank of Department of Anatomy, Navodaya Medical College, Raichur.

After collection of the hip bones (25 right and 25 left sided) samples randomly, sex of the hip bones is determined based on the non-metrical parameters,¹⁰ as seen in Figure 1

and Figure 2 these bones were further assessed with the metrical parameter. The metric parameter taken under the study is chilotic index (CI), which is calculated with the help of chilotic line as seen in Figure 3, the chilotic line is the line extending from iliopectineal eminence to the nearest point in the anterior auricular margin forming the pelvic segment, and from the previous point to the iliac crest, forming the sacral segment of the chilotic line. The non-metrical parameters taken were:

1. Pre-auricular surface: Para-acetabular groove (AG), Pre-auricular groove (PAG), and Piriform tubercle (PT)
2. Composite arch (CA)

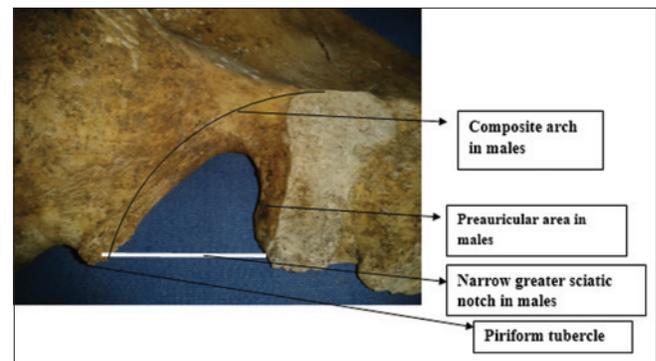


Figure 1: Male hip bone showing non-metrical parameters

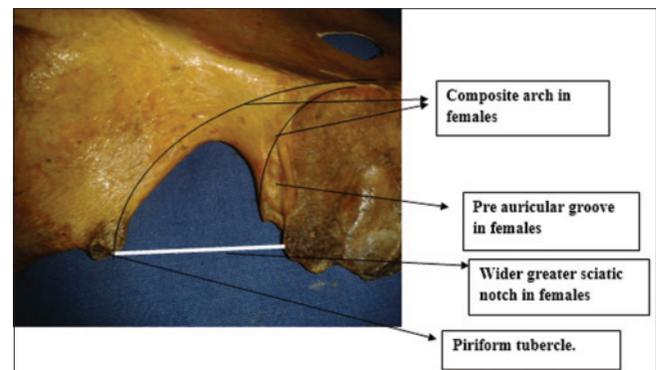


Figure 2: Female hip bone showing non-metrical parameters

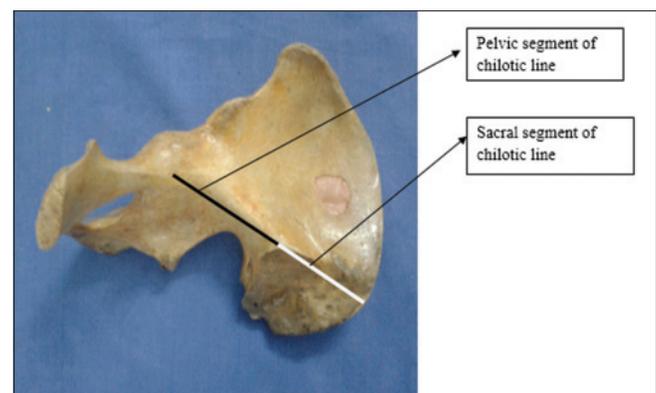


Figure 3: Chilotic line

- Inferior pelvis: Margo inferior ossis coxae (MOC), phallic ridge (PR), and Ischio-pubic ramus (IPR) aspect.

According to the above mentioned non-metrical parameters sex of the hip bone can be determined by the presence or absence of these characters, hip bones were classified as female bones due to the presence of PAG, the trait only found in female hip bones. The following characteristic were found with the increasing order of their presence in the hip bone to classify male or female hip bone, (1) MOC, (2) PR, (3) IPR aspect, (4) PT, (5) para AG, (6) CA, and (7) PAG. Accordingly 31 bones were classified as male hip bones and 19 hip bones were classified as female hip bones. Only fully ossified adult hip bones were included in the present study. Hip bones showing wear and tear, any fracture, or pathology were excluded.

The metrical parameter taken under study is CI.

Using vernier callipers, the chilotic line was measured (Figures 3-5). The CI is calculated as follows:

$$CI = \frac{\text{Sacral segment}}{\text{Pelvic segment}} \times 100$$



Figure 4: Measuring pelvic segment of chilotic line



Figure 5: Measuring sacral segment of chilotic line

RESULTS

All the 50 adult hip bones were measured for chilotic line. After all the measurements, the observations were statistically analyzed by using the unpaired *t*-test.

As shown in Table 1, the pelvic segment of the male hip bones falls in the range of 41.3-65.5 mm, with the mean value of 54.14 mm, whereas the pelvic segment of the chilotic line for females lie in the range of 53.4-77.5 mm, with the men value of 63.31 mm. While *P* and *t* values were 0.0001 and 5.8177, respectively.

As shown in Table 2, the sacral segment of male hip bones falls in the range of 56.1-73.5 mm, with the mean value of 62.98 mm, whereas the sacral segment of the chilotic line for females lie in the range of 42.7-56.4 mm, with the mean value of 49.45 mm. While *P* and *t* values were 0.0001 and 10.8844, respectively.

As shown in Table 3, the CI for male lies in the range of 85.648-172.397, with the mean value of 117.865 and for females the CI lies in the range of 55.096-100.177, with the mean value of 79.887. While *P* and *t* values were found to be 0.0001 and 7.8437, respectively.

Table 1: Pelvic segment of chilotic line

Group	Males	Females
Number of bones	31	19
Range	41.3-65.5 mm	54.4-77.5 mm
Mean	54.14 mm	63.31 mm
SD	4.942	5.934
<i>P</i> <0.0001		
<i>t</i> =5.8177		

SD: Standard deviation

Table 2: Sacral segment of chilotic line

Group	Males	Females
Number of bones	31	19
Range	56.1-73.5 mm	42.7-56.4 mm
Mean	62.98 mm	49.45 mm
SD	4.313	4.183
<i>P</i> <0.0001		
<i>t</i> =10.8844		

SD: Standard deviation

Table 3: Interpretation of CI

Group	Males	Females
Number of bones	31	19
Range	85.6-172.39 mm	55.09-100.17 mm
Mean	117.86	79.88
SD	4.313	4.183
<i>P</i> <0.0001		
<i>t</i> =7.8437		

SD: Standard deviation, CI: Chilotic index

In the present study for interpretation of CI, it is seen that higher frequency of male bones, about 26% were in the class interval of 116-125, followed by 23% in the class interval of 106-115, followed by 16% in the class interval of 96-105, followed by 13% in the class interval of 85-95, followed by 10% in the class interval of 126-135, followed by 6% in the class interval of 146-155, followed by 3% in class interval of 136-145, and another 3% in class interval of 146-155.

For interpretation of CI in females, the highest frequency of females bones lie in the class interval of 86-95, about 32%. 26% were in the class interval of 66-75, 21% were in 76-85, 16% were in 55-65, and 5% were in the class interval of 96-105.

In this study, it is seen that the CI differentiates sex except in the range of 85-105 where overlapping values is seen in both sexes, therefore the probability of the bone belonging to male is higher if the CI is more than 105 and to females if the CI is <85.

DISCUSSION

The mean pelvic and the sacral segment of the present study along with the mean of CI in both males and females are compared with other studies as shown in Table 4. In the present study, the mean value of pelvic segment and sacral segment along with the mean value of CI of males is found to be 54.14 mm, 62.98 mm, and 117.86, respectively and in females the mentioned parameters are found to be 63.31 mm, 49.45 mm, and 79.88, respectively. In the study done by Derry,¹¹ the mean values of pelvic segment, sacral segment and chilotic line in males are found to be 54.5 mm, 59.9 mm, and 124.4, respectively, and in females the mean values of

the mentioned parameters were found to be 59.1 mm, 60.8 mm, and 120.5, respectively.

The comparison with other authors is shown in Table 4.

CONCLUSION

From this study, it is concluded that the total chilotic line in males is longer than in females. The value of mean CI in males is found to be 117.86 and in females it is found to be 79.88, there from this study it is seen that average values of CI is more in males then in females. From the present study, it is also seen that few hip bones about 12% in females and 23% in males have overlapping values of CI lying in the range of 85-105, therefore from the present study of CI about 77% of hip bones were accurately classified as male hip bones and about 88% of hip bones were classified as female hip bones, from the present study, it is also concluded that the bones having the values of CI <85 belongs to females and the hip bones having the values of CI above 105 belongs to males.

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Table 4: Comparison of mean values of pelvic segment and sacral segment of the chilotic line and also CI with other studies

Investigator	Pelvic segment (mm)		Sacral segment (mm)		CI	
	Males	Females	Males	Females	Males	Females
Derry ¹¹	54.5	59.1	59.9	60.8	124.4	120.5
Davivongs ¹²	49.88	58.23	60.01	56.74	113.88	114.97
Charnalia ¹³	47.14	59.90	65.72	56.74	112.86	115.64
Sarangee <i>et al.</i> ¹⁴	54.3	60.0	62.0	50.35	116.30	110.5
Present study	54.14	63.31	62.98	49.45	117.86	79.88

CI: Chilotic index

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Isolation and Speciation of *Malassezia* in Patients Clinically Suspected of Pityriasis Versicolor

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Abstract

Introduction: *Malassezia* species are lipophilic yeasts recognized as commensals of skin that may be pathogenic under certain conditions. The most common described human infection due to a member of the genus is pityriasis versicolor (PV), a chronic, superficial disease of the stratum corneum layer of the epidermis containing the typical hyphal elements and yeast cells of *Malassezia furfur*.

Objectives: Identify and speciate *Malassezia* in patients clinically suspected of having PV.

Methodology: The study was conducted at the Department of Dermatology and Microbiology at Kempegowda Institute of Medical Sciences, Bengaluru, from July 2012 to June 2014. All clinically suspected cases coming to the Department of Microbiology were subjected to mycological work-up. Skin scrapings were microscopically examined with 10% potassium hydroxide (KOH) for budding yeast cells and fungal filaments and inoculated for culture using modified Dixon's media and Sabouraud's dextrose agar with and without olive oil at various temperatures. The growth in the culture tubes and plates were further speciated using biochemical tests.

Results: Total cases in the period of 2 years were 130. Male to female ratio is 1.6:1. The infection was common in the age group of 20-30 years. The common clinical presentation was hypopigmented lesion over the shoulder, arm, chest, and back. Out of the 130 suspected cases, KOH was positive in 120 and culture was positive in 130. Wood's lamp examination was positive in 100 cases, negative in 5 and it was not done in 25 cases. Wood's lamp positive cases were also positive for KOH and culture.

Conclusion: The most common species isolated was *M. furfur* followed by *Malassezia slooffiae*, *Malassezia pachydermatis*, *Malassezia globosa*, *Malassezia obtusa*, and *Malassezia restricta*. A prospective study was aimed to determine the incidence of *Malassezia* in patients clinically suspected of having PV and to speciate the identified isolates.

Key words: *Malassezia*, Pityriasis versicolor, Potassium hydroxide

INTRODUCTION

Malassezia is a lipophilic yeast found in areas rich in sebaceous glands of the human skin and other warm-blooded animals.¹ It is a part of normal flora of the human skin. In up to 90%

of adults, *Malassezia* is commonly found in seborrheic areas and becomes pathogenic in warm and humid environment.² The most common disease caused by *Malassezia* is pityriasis versicolor (PV).² *Malassezia* genus includes 12 species comprising of *Malassezia furfur*, *Malassezia pachydermatis*, *Malassezia sympodialis*, *Malassezia globosa*, *Malassezia obtusa*, *Malassezia restricta*, *Malassezia slooffiae*, *Malassezia dermatis*, *Malassezia japonica*, *Malassezia nana*, *Malassezia yamatoensis*, and *Malassezia equi*. The first seven species have been studied in relation to PV.² PV is a mild, chronic, usually asymptomatic superficial fungal infection³ that appears as round-to-oval lesions commonly found on the trunk and upper aspects of the arms. These lesions vary in color and can be hypo- or

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hyperpigmented⁴ or erythematous scaly skin lesions of the stratum corneum.¹ These yeasts are also associated with clinical infections such as folliculitis, seborrheic dermatitis, atopic dermatitis, confluent and reticulate papillomatosis, and systemic infections.^{5,6} The disease PV was described by Eichstedt in 1846, though he was unable to isolate the organism. Robin in 1853 isolated fungal elements from these lesions and named the organism as *Microsporum furfur*, since it was identical to the dermatophyte *Microsporum audouinii*. The disease was later renamed as tinea versicolor. These yeast cells were isolated from human dandruff scales by Malassez in 1874, and Baillon included this group of yeasts under the genus *Malassezia*. Sabouraud (1904) considered this organism as a cause of dandruff and gave it a new name, *Pityrosporum malassez*. In 1984, *Malassezia* gained priority over *Pityrosporum* and was accepted as the generic name for the fungus.⁷ *Malassezia* has also been shown to be associated with invasive infections in immunocompromized patients, especially those receiving intravenous lipids or with central venous catheters.¹ It is believed that endogenous factors such as increased sweating, administration of corticosteroids, malnutrition and increased plasma cortisol level, and exogenous factors like high temperature and humidity mediate the development of PV.¹ In spite of treatment, the recurrence rate of *Malassezia* is about 60% in the 1st year and 80% in the 2nd year.¹ If the disease is left untreated, it causes cosmetic problems of neck, face, trunk, etc.¹ In order to prevent morbidity, recurrence and invasive infections, early laboratory diagnosis of the condition is required.¹ Hence, a prospective study was aimed to determine the incidence of *Malassezia* in patients clinically suspected of having PV and speciate the identified isolates. Numerous studies have shown the relationship between these species and their role as causative agents in triggering of diseases.⁴ Present study was undertaken to isolate and speciate *Malassezia* in patients clinically suspected of PV.

OBJECTIVES

- Identify and speciate *Malassezia* in patients clinically suspected of having PV.

METHODOLOGY

The present study was conducted in the Department of Dermatology and Microbiology at Kempegowda Institute of Medical Sciences, Bengaluru, for 2 years, from July 2012 to June 2014. Consent was taken from all clinically suspected cases and after a detailed clinical history they were subjected to mycological work up.

Lesions of patients clinically suspected of having PV were examined under Wood's lamp for the presence of golden

yellow fluorescence in the Department of Dermatology. Those lesions that showed golden yellow fluorescence were wood's lamp positive and the others that did not show fluorescence were Wood's lamp negative.

Specimen Collection

After selection of an appropriate site, the affected area was cleaned aseptically with 70% ethyl alcohol and allowed to dry. Skin scrapings were done from the edges of the lesion using sterile scalpel or with the edge of a clean glass slide. The scrapings were subjected to both microscopy and directly inoculated onto the culture.

Microscopic Examination

Direct microscopic examination was undertaken by a wet mount preparation with 10% potassium hydroxide (KOH). It was placed in the incubator at 37°C for 15 min and then examined to detect the presence of hyphae and budding yeast cells, which generally exhibit the characteristic appearance of "spaghetti and meatballs (Figure 1)."^{8,9}

Culture Study

After the area is cleaned aseptically with 70% ethyl alcohol, the fine scales were collected directly onto modified Dixon's media containing chloramphenicol and Sabouraud's dextrose agar (SDA). SDA used were SDA with actidione and without olive oil at room temperature and at 37°C, SDA with actidione with olive oil at room temperature and at 37°C. The inoculated slants and plates were observed every day for the suspected growth of *Malassezia* for 7-21 days before negative results were noted. After the growth is seen, Gram's-staining was done to see for the Gram-positive budding yeast cells (Figures 2 and 3).

Biochemical Test

The gross morphology of suspected colonies of *Malassezia* was noted, and speciation was performed using the different biochemical tests such as the catalase test using 30% hydrogen peroxide, bile esculin splitting test, and cremaphore test using 10% castor oil and tween 20, 40, 80 utilization test was done by standard procedure and based on the results, speciation was done for *Malassezia*.

Catalase Test

Production of gas bubbles on adding a drop of 30% hydrogen peroxide indicated a positive reaction (Figure 4).

Bile Esculin Splitting Test

The colonies are streaked on bile esculin agar and development of black color indicated a positive test (Figure 5).

Tween (20, 40, 80) Utilization Tests

A lawn culture of the organism is prepared on SDA plate, and three wells are made into which tween 20, 40, 80 are

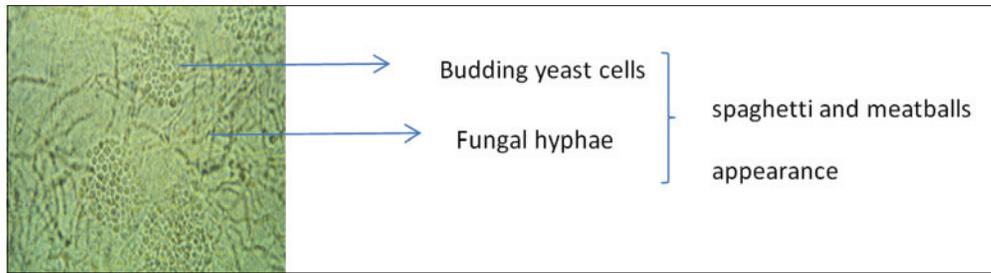


Figure 1: Potassium hydroxide preparation

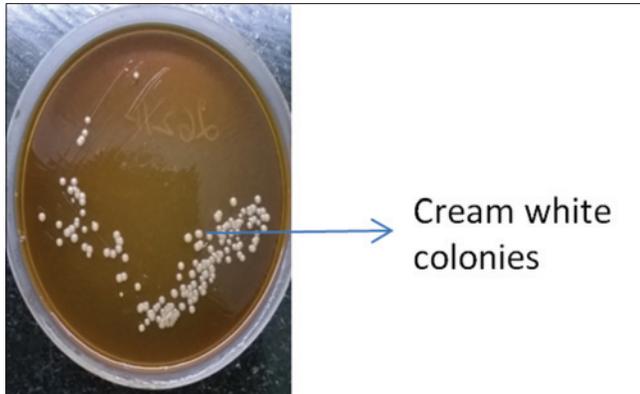


Figure 2: Growth on modified Dixon's media

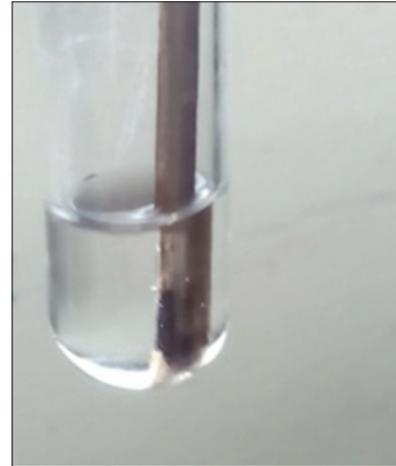


Figure 4: Catalase test

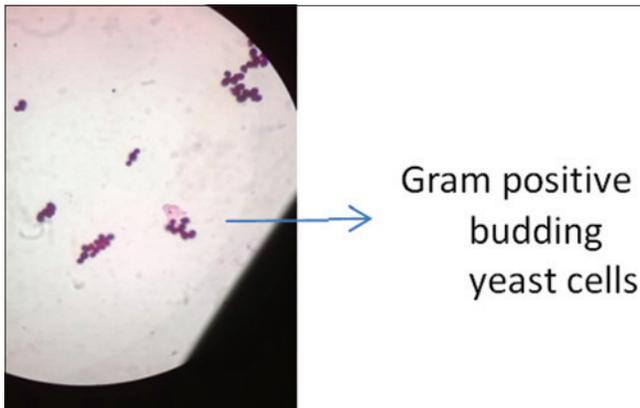


Figure 3: Gram's-staining



Figure 5: Bile esculin test

inoculated. Utilization of tweens was assessed by the degree of growth and/or reaction (precipitation) of the lipophilic yeasts around individual wells (Figure 6).

RESULTS

Total suspected cases of PV during the 2 years period was 130. The male to female ratio for the present study was 1.6:1. Out of the 130 suspected cases, 80 were males (62%) and 50 were females (38%) who presented with the clinical features of PV (Figure 7).

Out of the 130 suspected cases, 80 were males (62%) and 50 were females (38%) who presented with the clinical features

of PV. The highest prevalence of PV was observed in 20-30 years old age group with 47%, and the least affected were <10 years and >50 years (Figure 8).

Among the 130 cases, 90 cases presented with the hypopigmented lesion and 40 cases were hyperpigmented (Figure 9).

Wood's Lamp Examination

Out of the 130 cases, Wood's lamp was positive in 100 cases and negative in 5. It was not done in 25 cases (Figure 10).

Out of the 130 cases, KOH and culture was positive in 120 cases, 10 cases that were KOH negative was culture positive (Table 1).

Wood's lamp examination was done for 105 cases.

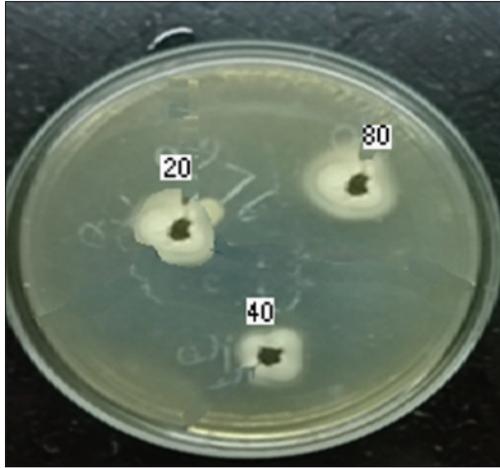


Figure 6: Tween (20, 40, 80) utilization tests

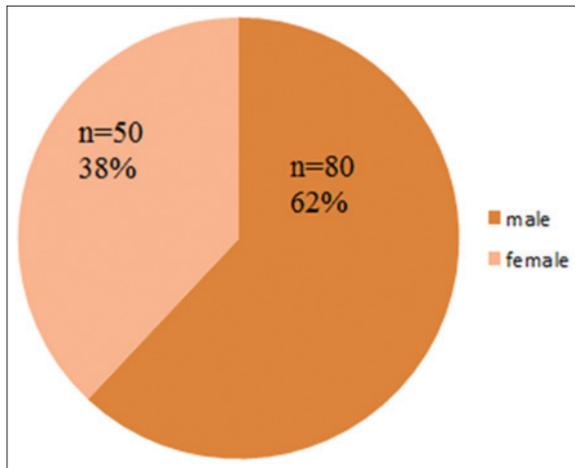


Figure 7: Sex distribution of clinically suspected cases

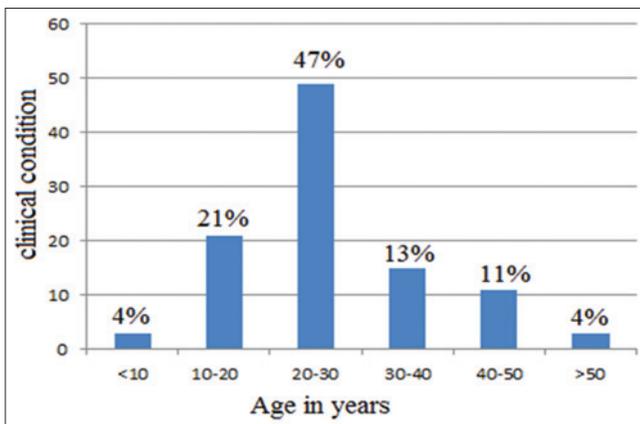


Figure 8: Distribution of pityriasis versicolor among different age groups

Out of the 130 cases, the Wood's lamp examination showed yellow fluorescence in 100 cases and was negative in 5. All 105 cases were both KOH and culture positive (Table 2).

Wood's lamp examination was not done in 25 patients. Of the 25 cases were Wood's lamp examination was not done KOH was positive in 15 and negative in 10 but, all 25 cases were culture positive (Table 3).

Table 4 differentiates the various species based on their biochemical reactions. All *Malassezia* species are lipid-dependent except *M. pachydermatis*. The species are

Table 1: Comparison of KOH and culture results

KOH	Culture	Total
Positive	Positive	120
Negative	Positive	10

KOH: Potassium hydroxide

Table 2: Comparison of Wood's lamp result, KOH, and culture

Tests done	Positive	Negative
Wood's lamp examination	100	5
KOH	105	0
Culture	105	0

KOH: Potassium hydroxide

Table 3: Comparison of Wood's lamp result, KOH, and culture

Test	Positive	Negative
KOH	15	10
Culture	25	0

KOH: Potassium hydroxide

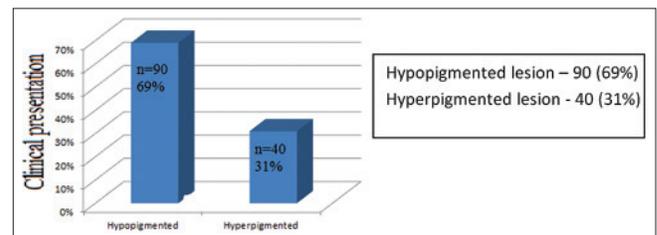


Figure 9: Distribution of clinical presentation of the patients

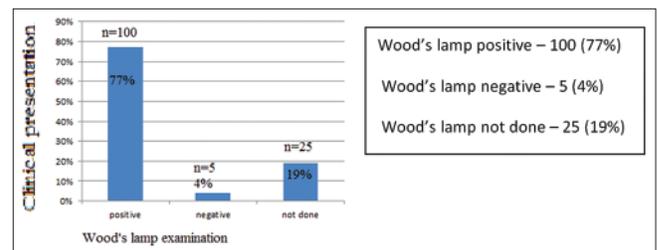


Figure 10: Distribution of Wood's lamp examination results

Table 4: Distribution of species based on their different biochemical reactions

Species	Lipid-dependence	Growth at 37°C	Catalase reaction	Esculin splitting	Cremaphore (10%)	Tween 20	Tween 40	Tween 80
<i>M. furfur</i>	+	+	+	-	V	+	+	+
<i>M. pachydermatis</i>	-	+	V	V	V	+	+	+
<i>M. sympodialis</i>	+	+	+	+	-	-	+	+
<i>M. globosa</i>	+	-	+	-	-	-	-	-
<i>M. obtusa</i>	+	-	+	+	-	-	-	-
<i>M. restricta</i>	+	-	-	-	-	-	-	-
<i>M. slooffiae</i>	+	+	+	-	-	+	+	-

M. furfur: *Malassezia furfur*, *M. pachydermatis*: *Malassezia pachydermatis*, *M. sympodialis*: *Malassezia sympodialis*, *M. globosa*: *Malassezia globosa*, *M. obtusa*: *Malassezia obtuse*, *M. restricta*: *Malassezia restricta*, *M. slooffiae*: *Malassezia slooffiae*

differentiated based on their growth, catalase reaction, esculin splitting, growth with cremaphore, and tweens at various concentrations.

Figure 11 shows the different species isolated - *M. furfur* is the most common isolate (52%) followed by *M. slooffiae*, *M. pachydermatis*, *M. sympodialis*, *M. globosa*, *M. obtusa*, *M. restricta*.

Table 5 shows the distribution of various species of *Malassezia* based on the body sites. *M. furfur* has been isolated from shoulder, arm, chest, neck, and back. *M. slooffiae* and *M. pachydermatis* have been isolated from the chest, *M. sympodialis* and *M. globosa* has been isolated from back, *M. obtusa* from shoulder and arm and *M. restricta* from chest lesion.

DISCUSSION

Association of *Malassezia* with various skin disorders such as PV, seborrheic dermatitis, and *Malassezia* folliculitis,¹⁰ has been well-known. The frequency of recovery from *Malassezia* depends on various factors such as age, sex, body sites, and differences in techniques of identification.

The total cases that came to the department of microbiology during the 2 years period were 130. 80 males (58%) and 50 females (42%) were suspected of PV. Male to female ratio was 1.4:1. Many studies by Shah *et al.*,¹ Shoeib *et al.*,² Ghosh *et al.*,³ and Kaur *et al.*,⁵ have shown the same pattern of male predominance. The male preponderance is because they are more involved with outdoor activities, which place them at high risk of exposure to factors such as high temperatures and humidity.¹

The highest prevalence of PV was observed in 20-30 years old age group, and the least affected were <10 years and >50 years. Studies by Shah *et al.*,¹ Shoeib *et al.*,² Tarazooie *et al.*,⁴ and Kaur *et al.*,⁵ has correlated with our findings. This indicated that the disease generally appears in the late teens, with a peak in the 20 years, when the sebum production is at the highest level and rarely found in

Table 5: Distribution of *Malassezia* species based on the body sites in PV

Species	Face	Neck	Chest	Back	Shoulder and arm	Abdomen
<i>M. furfur</i> (67)	5	10	15	10	25	2
<i>M. slooffiae</i> (23)	3	10	10	-	-	-
<i>M. pachydermatis</i> (17)	3	-	10	2	2	-
<i>M. sympodialis</i> (10)	-	-	2	4	4	-
<i>M. globosa</i> (5)	1	-	-	3	-	1
<i>M. obtusa</i> (4)	-	-	-	-	2	2
<i>M. restricta</i> (4)	-	1	2	-	1	-

PV: Pityriasis versicolor, *M. furfur*: *Malassezia furfur*, *M. slooffiae*: *Malassezia slooffiae*, *M. pachydermatis*: *Malassezia pachydermatis*, *M. sympodialis*: *Malassezia sympodialis*, *M. globosa*: *Malassezia globosa*, *M. obtuse*: *Malassezia obtuse*, *M. restricta*: *Malassezia restricta*

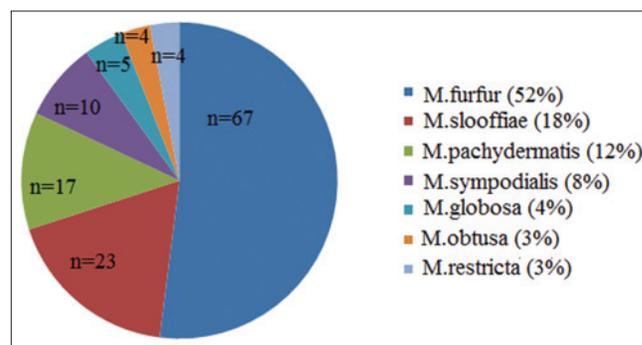


Figure 11: Different species of *Malassezia* isolated

elderly individuals. The most affected areas of the body were the trunk, shoulder, and arm, and least affected site were abdomen and face. These finding correlated with other studies of Shah *et al.*,¹ Shoeib *et al.*,² and Kaur M *et al.*⁵ In the present study, 90 cases showed the hypopigmented lesion and 40 cases were hyperpigmented. Shah *et al.*, Shoeib *et al.*, Kaur M *et al.*, and Bitu T *et al.*, have reported hypopigmented lesions as a common clinical presentation. Two cases presented with both hypopigmented and hyperpigmented lesions. Two different species were isolated in the above cases - *M. globosa* and *M. restricta* in one of the cases and *M. globosa* and *M. obtusa* in another case. Such finding has not been reported from any other studies. The hypopigmentation induced by this fungus can be explained on the basis of production of

dicarboxylic acids, a main component of which is azelaic acid. This acid acts through competitive inhibition of 3,4-dihydroxyphenylalanine tyrosinase and perhaps has a direct cytotoxic effect on hyperactive melanocytes. The pathogenesis of hyperpigmentation is also not fully understood, but it may be due to increased thickness of the keratin layer and more pronounced inflammatory cell infiltrate in these individuals that act as a stimulus for the melanocytes.⁹

Out of the 130 cases the Wood's lamp examination showed yellow fluorescence in 100 (77%) cases and all wood's lamp positive was culture positive. Five cases were wood's lamp negative but culture positive. In 25 cases, Wood's lamp was not done but *Malassezia* species were isolated in culture.

10% KOH was performed on all 130 cases, out of which, 120 samples were KOH positive, and all 130 samples were culture positive. 10 samples which were KOH negative, showed culture positive. In our study, *M. furfur* was the most common species that was isolated (52%), followed by *M. slooffiae* (18%), *M. pachydermatis* (12%), and *M. sympodialis* (8%), *M. globosa* (4%), *M. restricta* (3%), and *M. obtusa* (3%). In studies by Shah *et al.*,¹ *M. globosa* (50%), Shoeib *et al.*, *M. sympodialis* (54%), Ghosh *et al.*,³ and *M. globosa* (53%), and in the study by Kaur *et al.*,⁵ *M. furfur* (52%) was the common isolate.

CONCLUSION

Malassezia species can now be added to a growing list of normal skin flora organisms of low virulence that may cause mild recurrent skin infections and serious systemic infection in the susceptible host. Although, *Malassezia* species are considered as normal microflora of the human skin, these lipophilic yeasts are associated with many skin disorders in particular PV.⁵ The identification

of *Malassezia* yeast to species level is of importance to determine which species are implicated in skin disease and whether there is variation in the distribution of the yeast with clinical data, body site, and origin of the population, etc.⁵ Biomolecular techniques are considered as fast and more accurate methods to identify *Malassezia* species.⁶ However, simple methods based on morphology and physiology evaluation, such as the ones employed in this study, are more accessible to every laboratory.⁶ It would help to prevent recurrences, systemic complications and any cosmetological problems especially in patients of younger age group.

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Comparison of the Efficacy of Hip Screw and Nailing in Intertrochanteric Fractures of Femur at Tertiary Care Level Center: A Prospective Study

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Abstract

Background: Fractures around the proximal end of the femur is common among the elderly population. Intertrochanteric fractures are common due to osteoporosis and can result in increased morbidity or mortality. Timely operative management is warranted for the better functional outcome of the patients. We conducted our study to compare the effectiveness of dynamic hip screw (DHS) with a proximal femoral nail (PFN) in patients admitted with intertrochanteric fractures.

Materials and Methods: We conducted a prospective, randomized study including 50 patients in our Department of Orthopedics. All the patients were randomized into two groups: Group A (25 patients): Underwent PFN and Group B (25 patients): Were managed with DHS in patients of intertrochanteric fracture. We determined the effectiveness of the implants (PFN/DHS) in terms of intra-operative blood loss, length of surgery, and intra-operative complications. Clinical parameters with respect to the condition of the wound, Harris hip score and shortening and radiological parameters like amount of union or collapse and any associated complications were also assessed in our study.

Results: The duration of surgery in Group A (55.68 ± 5.74 min) was statistically significant to Group B (75.69 ± 6.45 min) ($P = 0.0001$). The blood loss in patients implanted with PFN (166 ± 20.56 ml) was significant as compared to patients with DHS (245 ± 33.79 ml) ($P = 0.0001$). The patients with PFN group experienced less shortening (4.21 ± 1.90 mm) as compared to DHS group (8.62 ± 2.09 mm) ($P = 0.0001$). Only one patient experienced fracture displacement by nail insertion in patients implanted with PFN and two patients had fractured lateral cortex while placement of DHS.

Conclusion: PFN is a better alternative than DHS for the fixation of intertrochanteric fractures.

Key words: Dynamic hip screw, Intertrochanteric fractures, Proximal femoral nail

INTRODUCTION

The intertrochanteric fractures are the extracapsular fractures occurring at the proximal end of the femur along the path of least resistance.¹ The fractures of the femur along the intertrochanteric region are common because of the non-homogenous and more complex osseous structure. 26% of all of the hip fractures occurred in Asia in 1990, and the estimates have a rising trend of 37% by 2025.²

In the past, non-operative method of treatment was practiced on the wider scale due to lack of surgical skills. However, non-operative technique should be performed in patients not having a life expectancy of more than 6 months, patients with chronic or debilitating illness, and patients with infection of the fractured bone itself which can itself lead to implant failure.³ After the introduction of the surgical options for the fixation of intertrochanteric fractures, the complications related to prolonged bed rest and immobilization are reduced thereby improving the functional outcome of the patients.

Intertrochanteric fractures can be fixed by intramedullary or extramedullary devices.⁴ However, the treatment of the respective fractures is much dependent on the type, site and pattern of the fracture. For a long time, dynamic

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hip screw (DHS) has been a gold standard of treatment for the fractures of the intertrochanteric region but due to better biological advantages the intramedullary nails has also shown promising role.^{5,6} The intramedullary nails provides better fixation, allows better weight bearing, less tissue trauma and reduced blood loss as compared to laterally side fixed plates.^{7,8}

Based on above observations and extensive Cochrane search revealed limited literature regarding the use of intramedullary nail (proximal femoral nailing [PFN]) as compared to DHS. We planned to execute a comparative study on PFN and DHS for intertrochanteric fracture fixation in elderly patients and tries to find out a promising implant among them.

MATERIALS AND METHODS

After obtaining written consent from the patients and clearance from Institutional Ethical Committee we conducted a prospective, randomized study including 50 patients in our Department of Orthopedics from January 2014 to June 2015. The patients of either sex, above the age of 50 years, with intertrochanteric fracture Type 31-A2/A3 according to Orthopedic Trauma Association classification and with anesthesia fitness were included in our study. We excluded the patients unwilling for the surgical intervention, <50 years of age, pathological or compound fractures and who are admitted for re-operation.

After obtaining a proper history and physical examination and the radiographs of both the hip joints, the all patient's investigations according to anesthesia checkup. The patients were planned to get operated within 24 h of anesthesia fitness. All the patients were randomized into two groups: Group A (25 patients): Underwent PFN and Group B (25 patients): Were managed with DHS in patients of intertrochanteric fracture.

The standard PFN nail length (250 mm) was taken for all the patients. On anterior-posterior (AP) X-ray of the hip joint, the diameter of the femur was determined at the level of the isthmus and simulated as PFN nail diameter and the neck-shaft angle was measured using the goniometer. The DHS side plate length was determined such that it allows the hold of at least 8 cortices to the shaft distal to the fracture. The DHS compression screw length was measured on AP X-ray (deducting magnification) from the head to the base of greater trochanter and neck-shaft angle was obtained using goniometer.

We determined the effectiveness of the implants (PFN/DHS) in terms of intra-operative blood loss, length of

surgery and intra-operative complications. Moreover, we also observed the suitability of the implant based on different intertrochanteric fracture types and also in terms of patient's functional outcome, recovery, and complications. Clinical parameters with respect to the condition of the wound, Harris hip score and shortening and radiological parameters like amount of union or collapse and any associated complications were also assessed in our study.

As per our institutional protocol, the drain was removed after 1-day. The patients were encouraged for early mobilization and ankle or calf physiotherapy. The wound was inspected on every 3rd day, and the stitches were removed on 11th day post-operatively. The patients were advised to visit the outpatient department clinic every monthly until the fracture unites and then on 6 monthly basis thereafter.

Statistical Analysis

All the parametric data was analyzed using Student's *t*-test and non-parametric data using Chi-square/Fisher test whichever is applicable. Data was analyzed using Statistical Package for Social Sciences version 19.0. A *P* < 0.05 was considered statistically significant.

RESULTS

We enrolled 50 patients successfully in our study. Out of 50 patients, 22 were males and 28 were females. All patients were comparable in demographic characteristics (Table 1).

The duration of surgery in Group A (55.68 ± 5.74 min) was statistically significant to Group B (75.69 ± 6.45 min) (*P* = 0.0001) (Table 2 and Figure 1). The blood loss in patients implanted with PFN (166 ± 20.56 ml) was significant as compared to patients with DHS (245 ± 33.79 ml) (*P* = 0.0001) (Table 2 and Figure 1). The patients with PFN group experienced less shortening

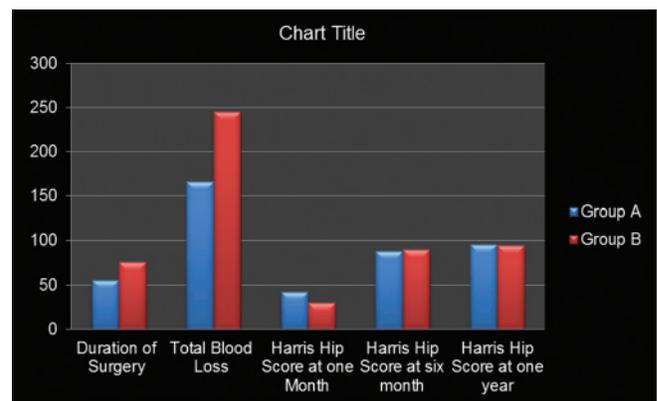


Figure 1: Proximal femoral nail versus dynamic hip screw

(4.21 ± 1.90 mm) as compared to DHS group (8.62 ± 2.09 mm) ($P = 0.0001$) (Table 2). Superficial infection was observed to be in one patient in Group A while Group B had a superficial infection in three patients ($P=0.61$). However, none of the patients experienced a deep infection in any of the patients. Due to superficial infection, two patients had experienced implant failure in DHS patients while none of the patients had implanted failure in patients with PFN ($P = 0.49$) (Table 2). Two patients experienced malunion in patients with DHS ($P = 0.49$). The loss of flexion at the hip of more than 10° was found in one group in Group A and two patients in Group B ($P = 0.99$) (Table 2). The Harris hip scores at 1 month were significantly better in PFN group (41.74 ± 4.63) than DHS group (29.91 ± 5.16) ($P = 0.0001$). However, the Harris hip scores at 6 months and 1 year were also observed to be comparable on inter-group comparison (Table 2 and Figure 1).

On observing the intra-operative complications, only one patient experienced fracture displacement by nail insertion in patients implanted with PFN and two patients had fractured lateral cortex while placement of DHS (Table 3). Only one patient had an improper insertion of compression screw in patient implanted with DHS (Table 3).

DISCUSSION

Intertrochanteric fractures require early operative treatment so as to decrease the morbidity or mortality associated with prolonged bed rest and immobilisation.⁹ Both intramedullary and extramedullary techniques have been used in the past for the fracture fixation, but the role of intramedullary nail has observed to be more promising theoretically.

In our study of 50 patients, 28 patients were female with a history of a simple fall or jerk while performing their routine work. This can be explained from the fact that the elderly females are having osteoporosis and thus exposing themselves to fracture risk. Our findings are further supported by Pugh *et al.*¹⁰ and Cummings *et al.*¹¹ who also reported a greater number of female patients in their study with a history of simple fall.

The duration of surgery in the patients implanted with PFN was statistically significant and less than those whose fractures were fixed by the lateral plate. However, a study conducted by Khan¹² on 70 patients operated for proximal femur fractures, they observed a statistical insignificant difference on comparing the mean duration of surgery. As the duration of surgery increases the risk of bleeding and other intra-operative complications rises. We observed a statistically decreased amount of bleeding in patients

Table 1: Demographic characteristics (mean±SD)

Variables	n=25		P value
	Group A	Group B	
Age	58.87±4.21	59.37±5.78	0.73
Sex (M:F)	10:15	12:13	0.59
Weight (kg)	71.13±8.83	70.82±9.07	0.91
Height (m)	1.60±0.08	1.61±0.07	0.64

SD: Standard deviation

Table 2: Comparison between PFN and DHS (mean±SD)

Variables	n=25		P value
	Group A	Group B	
Duration of surgery (min)	55.68±5.74	75.69±6.45	0.0001*
Total blood loss (ml)	166±20.56	245±33.79	0.0001*
Shortening (mm)	4.21±1.90	8.62±2.09	0.0001*
Implant failure (%)	0 (0)	2 (12)	0.49
Malunion (%)	0 (0)	2 (8)	0.49
Superficial infection (%)	1 (4)	3 (12)	0.61
Deep infection (%)	0 (0)	0 (0)	-
Loss of flexion of hip (>10°) (%)	1 (4)	2 (8)	0.99
Harris hip score			
At 1 month	41.74±4.63	29.92±5.17	0.0001*
At 6 months	88.50±6.31	89.91±7.79	0.49
At 1 year	95.31±4.57	94.69±6.47	0.69

PFN: Proximal femoral nail, DHS: Dynamic hip screw, SD: Standard deviation, *: $P < .0001$

Table 3: Intra-operative complications

Complications	n=25	
	Group A	Group B
Failure to achieve closed reduction	0	0
Fracture displacement by nail insertion	1	0
Improper insertion of compression screw	0	1
Varus angulation	0	0
Fracture lateral cortex	0	2

treated with PFN. Our findings are supported by Khan¹² as they observed similarly increased bleeding with DHS despite of similar length of surgery.

In our study, the patients receiving intramedullary nail (PFN) has less shortening compared to extramedullary fixation. This can be attributed from the fact that intramedullary nail has a short lever arm and thus the distance between the hip joint and fracture site is reduced thereby providing more stability and less deforming forces to the joint. Our findings were supported by Bhakat and Bandyopadhyay¹³ as they observed similar less shortening on the patients implanted with PFN.

In our study, we encountered with three patients having a superficial infection in the DHS implanted group. Out of the three patients, two underwent implant failures, and one was managed by antibiotics and debridement. Only

one patient in PFN group had an experience of superficial infection but it was managed by proper antibiotics and, therefore, did not land on the failure of the implant. Moreover, the plate and screw fixation causes lesser anatomical stability of fractures together with osteoporotic bone causes more chances of implant failures. Lunsjo *et al.*¹⁴ reported an incidence of 10% failure rates on patients of unstable Intertrochanteric fractures implanted with DHS. Two patients suffered from malunion in our study who had received a plate fixed on the lateral cortex. However, Walia *et al.*¹⁵ conducted a study on 30 patients operated for intertrochanteric fractures and reported only one case of malunion with patients implanted with DHS. These findings suggest that PFN is a better alternative for intertrochanteric fractures as it imparts better fracture stability.

For the assessment of joint function and implant follow-up, we performed Harris hip scoring at 1 month, at 6 months, and after 1 year of operative intervention. The scores were significantly better with the patients implanted with intramedullary nail compared to hip screw at 1 month of operation. However, on long-term follow-up the hip scores were observed to be comparable among them. Khan¹² showed that the hip scores were better in patients under PFN group, although they evaluated their patients after 3 months.

CONCLUSION

From our study, we conclude that extracapsular fractures are a common entity and can be successfully managed by using PFN intramedullary implant. The patients implanted with PFN had a better functional outcome,

lesser complications and by providing earlier mobilization it decreases the overall morbidity or mortality.

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Benign Pelvic Masses Associated with Raised CA 125 Level: Radiological Pathological Correlation

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Abstract

Introduction: The detection of pelvic mass with associated raised CA 125 level is highly suspicious for ovarian cancer, but there are various other benign pelvic pathologies that mimic the above findings, especially in premenopausal women in the Indian subcontinent as seen in our case series.

Purpose: Purpose of the study was to look for different benign pelvic masses associated with raised level of CA 125.

Materials and Methods: It was prospective study in which cases of pelvic mass with raised CA 125 level that turned out to be benign in etiology on complete work up were evaluated and followed up on treatment at 2 months of interval with serial measurement of CA 125.

Result: Out of 15 cases of benign pelvic masses with raised CA 125 level, 10 cases were of genital tuberculosis and associated pelvic inflammatory disease, 4 cases were of endometriotic cysts, and 1 case was of ruptured dermoid cyst of ovary. All cases showed a significant reduction in CA 125 level on follow-up at 2 months.

Conclusion: There are various benign pelvic masses that are associated with raised CA 125 level. Detailed clinical history and radiological investigations can be helpful in arriving at a correct diagnosis. This is more important in India subcontinent where genital tuberculosis and pelvic inflammatory disease are common.

Key words: CA 125 antigen (cancer associated 125 antigen), Endometriosis, Ovarian dermoid cyst, Female genital tuberculosis, Ovarian neoplasm, Pelvic inflammatory disease

INTRODUCTION

The detection of pelvic mass with raised CA 125 level is highly suspicious for ovarian cancer, but there are various other benign pelvic pathologies that mimic the above findings. This is especially important in women of reproductive age group in the Indian subcontinent where pelvic inflammatory disease and female genital tuberculosis are common.

Ovarian cancer is one of common female gynecological cancer and majority of cases are diagnosed in late stages

contributing to poor prognosis and outcome.¹ For early detection of ovarian cancer, various tumor markers have been studied, and CA 125 is one of them. It is elevated in 80% of malignant ovarian neoplasm of non-mucinous origin.² Bast³ have proposed CA 125 as a relatively specific marker for ovarian cancer. The CA 125 molecule is a 200-kDa glycoprotein and was initially identified on the surface of the ovarian carcinoma cell line OVCA 433.⁴ The value of CA125 varies between laboratories depending on the type of assay used but levels <35 kIU/L is considered to be normal.⁵

However, serum CA 125 level can often be elevated in various benign and inflammatory gynecological conditions as well as a non-gynecological condition such as liver and pulmonary disease. Differentiating benign from early malignant ovarian disease is important and provides a diagnostic challenge. The combination of pelvic mass and elevated level of CA 125 arouses the suspicion of ovarian malignancy, but other conditions should always

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be considered in the differential diagnosis especially in premenopausal women.

Malkasion⁶ in a study, found out that out of 59 patients with histologically proven benign ovarian cysts, 17 had elevated concentration of CA 125 in serum. Similar findings were seen in the study by Dixia⁷ in which many cases of benign pelvic masses had significantly elevated serum level of CA 125. These studies demonstrate that using CA 125 in isolation has limited value in differentiating benign from malignant pelvic masses. Clinical details and radiological information provide crucial additional information on which to base a diagnosis.

Pelvic ultrasound in conjunction with CA 125 represent the most frequent used initial investigation for patient with adnexal masses as ultrasound is widely available and cheaper. Computed tomography (CT) scan has limited value in the initial assessment of adnexal masses due to poor soft tissue discrimination and disadvantage of radiation exposure. Magnetic resonance imaging (MRI) is helpful in detection of the organ of origin of pelvic masses and confirming the diagnosis of endometriosis. As it is evident from above studies that all the modalities are complimentary to each other with ultrasound remaining the first diagnostic modality of choice as it is cheap and widely available in all units.

As the CA 125 molecule is identified in normal peritoneal and fallopian tubes, it is not surprising that inflammation of these tissues can result in an increased concentration of CA 125 level in serum. Similar findings were seen in our case series where many patients with confirmed diagnosis of benign pelvic mass lesions such as pelvic inflammatory disease, female genital tuberculosis, endometriosis, and ruptured dermoid cyst of ovary were associated with raised serum level of CA 125 that showed significant decrease at 2 months interval on treatment.

MATERIALS AND METHODS

The case series include those cases (15 cases) that presented between January 2013 to January 2015 at our institution as pelvic mass detected on ultrasound with elevated serum level of CA125, however on complete workup by radiological investigations (CT scan/MRI Scan), pre-operative CT/ultrasonography (USG) guided fine-needle aspiration cytology (FNAC), diagnostic laparoscopy/therapeutic laparotomy with histopathology examination of operative specimen or biopsy material; turned out to be benign pelvic masses. The CA 125 level more than 35 units/ml was considered as elevated. These cases on treatment were followed at 2 months interval with measurement of CA 125 level.

RESULTS

Out of 15 cases, 6 cases were of tubercular salpingitis. These presented with bilateral complex cystic adnexal masses on transabdominal ultrasound with ovary visualized separately on transvaginal sonography (Figure 1a). CT scan of pelvis revealed bilateral complex adnexal masses with omental thickening and nodularity with minimal free fluid in pelvis raising suspicion of neoplastic etiology (Figure 1b). Mean CA 125 level of these cases at the time of presentation was 650 units/ml. The patients were subjected to diagnostic laparoscopy which revealed thickened, edematous bilateral fallopian tubes with omental thickening, and extensive adhesions. FNAC and biopsy were taken from omental thickening and thickened fallopian tube which revealed caseating granuloma with acid-fast bacilli (Figure 1c and d). Fluid cytology of ascitic fluid revealed lymphocytic predominance with absence of malignant cells. The patients were put on anti-tubercular treatment (AKT) and on 2 months follow-up bilateral adnexal masses have significantly reduced in size, and mean CA 125 level decreased to 115 units/ml.

Two patients were of tubercular pyosalpingx. These cases presented with a low-grade fever since 2 months associated with lower abdominal pain. Transabdominal and transvaginal sonography revealed dilated tortuous tubular structures in both adnexa with ovary visualized separately (Figure 2). Echoes were seen within it. Laparoscopy was done for the preservation of Tubal patency, and fertility and diagnosis of tubercular pyosalpingx were made. Mean CA 125 level initially was 250 units/ml which reduced to 65 units/ml at 2 months follow-up on treatment with AKT.

Two cases were of bilateral tubercular tuboovarian abscesses. In these cases, transabdominal and transvaginal sonography revealed bilateral complex tuboovarian masses with ovary not separately visualized. Similar findings were seen on CT scan, and CT guided FNAC revealed lymphocytic caseating granulomas with acid-fast bacilli. Mean CA 125 level at the time of presentation was 370 units/ml which reduced to 75 units/ml at 2 months follow-up on AKT.

A single case of ruptured dermoid cyst of the ovary was encountered with elevated CA 125 level of 300 units/ml. This 27-year-old patient presented with left lower abdominal pain with USG suggestive of bilateral ovarian dermoids with omental fat stranding and edema on the left side (Figure 3a). CT pelvis revealed fat attenuation lesions in both ovaries with calcific nodule and fat stranding and inflammation in surrounding mesentery and omentum on the left side due to ruptured dermoid (Figure 3b). Laparotomy was done in view of adhesions and consequent small bowel

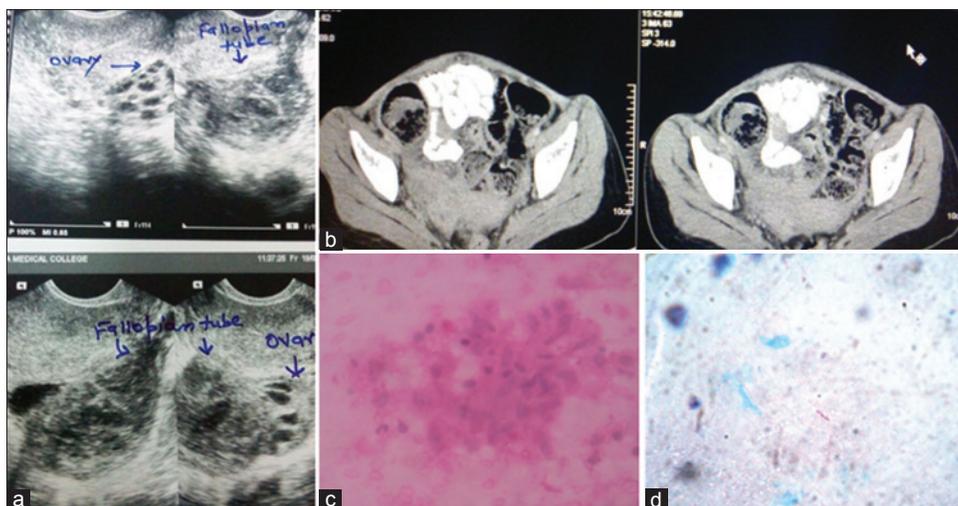


Figure 1: (a) Transvaginal ultrasonography (USG) and (b) contrast computed tomography (CT) pelvis showing adnexal mass separate from ovary on USG with CT scan showing heterogeneous enhancing adnexal mass with omental thickening and nodularity, (c) cytology smears showed granuloma comprising of epithelioid histiocytes, (d) Ziehl-Neelsen staining showed acid-fast bacilli

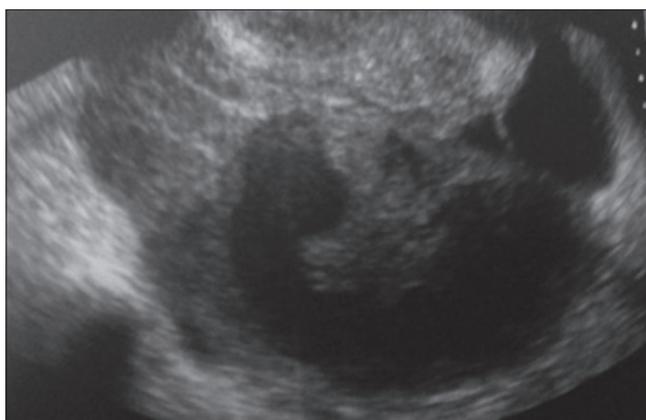


Figure 2: Transvaginal sonography showing dilated tubular tortuous structure in adnexa with echoes within suggestive of pyosalpinx

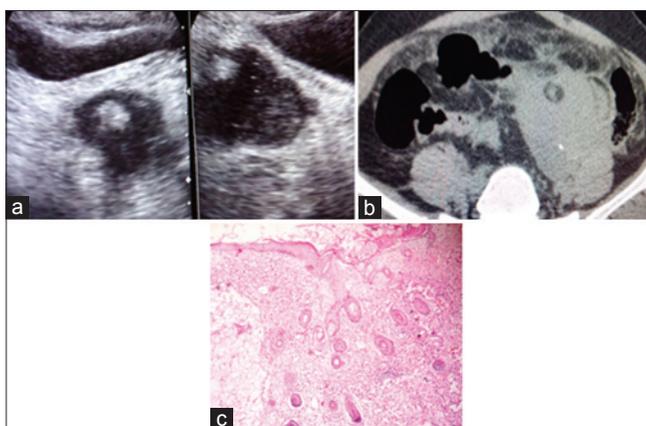


Figure 3: (a) Ultrasonography and (b) computed tomography scan showing ruptured dermoid cyst with omental inflammation, (c) microphotograph of dermoid shows cyst lined by stratified squamous epithelium with underlying adnexal structures

obstruction which confirmed the diagnosis with a biopsy of omentum revealing keratin granulomas and histopathology of specimen s/o dermoid cyst (Figure 3c).

Four cases of elevated CA 125 level were seen in cases of endometriotic cysts. The first case was of 46 years unmarried female presenting with pelvic mass with CA 125 level of 125 units/ml. The transabdominal sonography revealed bilateral adnexal large cystic masses of size more than 10.0 cm with thick septa and without solid component with mild bilateral hydroureteronephrosis. CT pelvis revealed bilateral adnexal complex cystic masses with ovaries not separately visualized. Based on these findings differential of endometriotic cyst versus cystadenocarcinoma was made. The patient underwent laparotomy with histopathology of surgical specimen confirming the diagnosis of the endometriotic cyst. On 2 months follow-up CA 125 level reduced to 25 units/ml.

The second case is of 55 years post-menopausal women detected to have bilateral complex ovarian lesions with suspicion of the nonenhancing solid component on left side adhering to left lower ureter with consequent mild left sided hydroureteronephrosis on USG and CT scan. CA 125 level was 105 units/ml and differential of malignant ovarian neoplasm versus endometriotic deposits were made. The patient underwent laparotomy and diagnosis of the endometriotic cyst with endometriotic deposits. In cul-de-sac and surrounding left ovary were made. CA 125 level at 2 months follow-up reduced to 20 units/ml.

Last two cases (age 30 and 32 years) presented with bilateral complex ovarian lesions with dense echoes on USG (Figure 4a) with MRI revealing blood product appearing

hyperintense on T1W images (Figure 4b) and hypointense on T2W images confirming the diagnosis of chocolate cyst (endometriotic cyst). Mean CA 125 level at the time of presentation was 85 units/ml which dropped to 20 units/ml at 2 months follow-up.

Description of these cases has been summarized in Table 1.

DISCUSSION

Ovarian cancer is one of the common malignancy in females in the Indian population. Most of these cases present at late stages and have poor prognosis.¹

The incidence of ovarian cancer is low in young women, and epithelial ovarian cancers are not known to occur before menarche, and most of them (though rare) are germ cell tumor, juvenile granulosa cell tumor, and serous borderline tumors. Age-specific incidence is 40/100,000 by the age of 50 and rises to 50 per 100,000 women by the age of 65 years.²

Various tumor markers have been studied for the early detection of ovarian cancer and out of them, CA 125 has been proposed by Bast³ as a relatively specific marker for ovarian cancer. The CA 125 molecule is a 200-kDa glycoprotein and was initially identified on the surface of the ovarian carcinoma cell line OVCA433.⁴ CA 125 is widely

distributed on the surface of both healthy and malignant cells of mesothelial origin, including pleural, pericardial, peritoneal, and endometrial cells, as well as in normal genital tract and amniotic membrane. Interestingly, the molecule is not present on the surface of normal ovarian cells, but is present in 80% of malignant ovarian tissue of non-mucinous origin.² The value of CA 125 varies between different laboratories depending on type of assay used, but levels <35 kIU/L are considered to be normal.⁵

In view of wide distribution of CA 125 expression, serum CA 125 levels can be raised in various benign and inflammatory conditions such as menstruation, pregnancy, endometriosis, pelvic inflammatory disease, and non-gynecological conditions including various liver and pulmonary diseases. This is more common in the Indian population where cases of female genital tuberculosis and pelvic inflammatory disease are extensively found as seen in our case series.

It is important to differentiate benign ovarian pathologies from early stages of carcinoma ovary as it has an important impact over patient prognosis. The combination of pelvic mass and elevated level CA 125 arouses the suspicion of ovarian neoplasm, but other benign conditions should always be considered in the differential diagnosis, especially in a pre-menopausal female in the Indian scenario. Malkasion⁶ studied 59 patients with histologically proven benign ovarian cysts. Out of these patients 17 had elevated concentrations of CA 125 (12>35 units/ml, 4>65 units/ml, and 1>2000 units/ml). In another study by Dixia⁷ using 153 patients with benign pelvic masses, 10 patients had CA 125 concentrations >188 units/ml and one patient had a value of more than 400 units/ml. Nolen *et al.* screened 65 biomarkers in patients with adnexal masses, and more than half of the biomarkers differed significantly between benign and malignant masses. CA 125 and HE4 in combination provided the highest discrimination between benign and malignant cases.⁸ These studies demonstrate that using CA 125 in isolation has limited value in differentiating benign from malignant pelvic masses as seen in our case series. The clinical details and radiological investigation provides crucial additional information for making the diagnosis.

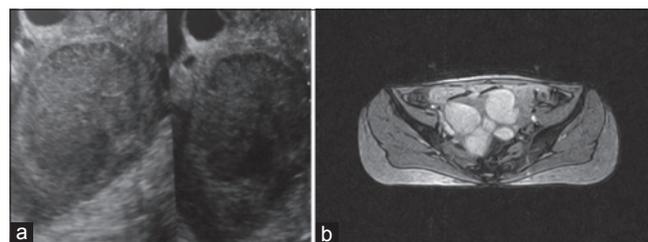


Figure 4: (a) Transvaginal sonography and (b) Magnetic resonance imaging pelvis showing bilateral endometriotic cysts

Table 1: Mean level of ca 125 at initial presentation and two months follow-up in different cases of benign pelvic masses

Type of cases	Number of patients	Initial CA125 level (average/mean)	CA125 at 02 months interval (on treatment)
Tubercular salpingitis with pelvic inflammatory disease	06	650	115
Tubercular pyosalpingx	02	250	65
Complex tuboovarian masses (tuboovarian abscess) of Tubercular etiology	02	370	75
Ruptured ovarian dermoid	01	300	40
Endometriotic cysts	04	100	21

Pelvic ultrasound in conjunction with CA 125 represents the most frequent performed initial investigations for patients with adnexal masses. CT scan has limited value in the initial assessment of adnexal masses due to poor soft tissue discrimination and with disadvantages for irradiation,⁹ but can help to assess the extent of disease in the upper abdomen prior to primary cytoreduction and following chemotherapy to detect resistant disease or recurrence.¹⁰ The CT scan in our case study was also not confirmatory in differentiating infective tuboovarian masses from ovarian

malignancy. MRI has also been suggested to be helpful in detection of the organ of origin for pelvic masses. MRI has been shown to correctly identify organ of origin in 94% compared to only 66% of ultrasound.¹¹ Review of literature from 1990 to 2006 which included 143 studies showed that ultrasound findings were similar to CT and MRI in the differentiation of benign from malignant ovarian masses.¹² However, MRI is extremely useful in confirming the diagnosis of endometriotic (chocolate) cysts in most of the cases. Currently, newer imaging in the form of positron emission tomography (PET) and CT can be used to judge the extent of the disease and also differentiate between malignant and benign masses.¹³ As it is evident from above studies, all the modalities are complimentary to each other with ultrasound remaining the first diagnostic modality as it is cheap and widely available in all units.

As the CA 125 molecule is identified in normal peritoneal and fallopian tubes, it is not surprising that inflammation of these tissues can result in an increased concentration of serum CA 125. Ruibal *et al.*¹⁴ found that nine of twelve women with suspected peritonitis had CA 125 concentrations of >65 units/ml with two patients having a value >500 units/ml. A more definitive study examined CA 125 values in 30 patients with a pelvic inflammatory disease associated with fever who had a good response to antibiotic therapy. CA 125 >100 units/ml was seen in 5 patients (17%) and the highest value was 550 units/ml.¹⁵ This increased serum concentration of CA 125 can be explained by the local expression by the inflamed tissue. Another study of 33 patients with the pelvic inflammatory disease showed that 32 patients had increased concentrations of CA 125 with values between 100 and 1300 units/ml.¹⁶ These findings are similar to findings in our case series where the highest level of CA 125 was seen in cases of tubercular salpingitis and pelvic inflammatory disease that were associated with localized peritonitis and inflammation of surrounding peritoneum and omentum. However in our cases, the highest level of CA 125 was never >700 units/ml.

Similarly, high level of CA 125 was seen in those cases of endometriosis that were associated with peritoneal implants. The high level of CA 125 seen in the case of ruptured dermoid cyst of ovary could be attributed to inflammation of omentum induced by keratin granulomas.

Most of our cases were followed at 2 months interval on treatment, where there was a significant reduction in levels of CA 125 in all cases.

CONCLUSION

Detection of pelvic mass with raised CA 125 level raises suspicion for ovarian malignancy, but there are various benign pelvic conditions that are associated with raised CA 125 level. This is more important in the Indian subcontinent where genital tuberculosis and pelvic inflammatory disease is common as seen in our case series where 66% of cases of benign pelvic masses with raised CA 125 level turned out to be tubercular etiology. Detailed clinical history and radiological investigations can be helpful in arriving at a correct diagnosis and differentiating benign pelvic masses from early ovarian malignancy.

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Comparative Study of Surgical Outcome of Single-Flap Anastomosis versus Double-Flap Anastomosis Technique of External Dacryocystorhinostomy

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Abstract

Background: Dacryocystitis is a common disorder affecting the lacrimal sac. There are a number of surgical procedures available for management of dacryocystitis. External dacryocystorhinostomy (DCR) is the surgical procedure of choice for the management of chronic dacryocystitis.

Materials and Methods: The present study was a prospective, interventional, hospital-based study conducted in the Eye department of R D Gardi Medical College, Ujjain, India. 90 patients >20 years of age were enrolled for the study. The patients were divided into two groups: Group A (45 patients) who underwent single-flap DCR and Group B (45 patients) who underwent double-flap DCR for studying the surgical outcome of both the techniques of external DCR. Each patient was subjected to a comprehensive ophthalmic evaluation, followed by the surgical procedure as per assigned group and the results were recorded and analyzed in detail.

Results: In our study, 90 patients suffering from chronic dacryocystitis were enrolled. In our study 29 (32.22%) patients were males and 61 (67.77%) patients were females. Our study showed a preponderance of dacryocystitis in the females. 62 (85%) of our patients had epiphora as the main presenting feature. In our study, severe hemorrhage was seen in 17 (18.88%) patients. We did not find any significant difference in the surgical success rate of both Group A and Group B (single-flap versus double-flap procedure). The success rate was 93.33% in Group A and 97.77% in Group B ($P = 0.616$, not significant).

Conclusion: Chronic dacryocystitis is a fairly common problem causing troublesome epiphora. In our study, we found that the simpler technique of single-flap anastomosis yields comparable results to the technically challenging double-flap anastomosis technique of DCR surgery.

Key words: Dacryocystitis, Dacryocystorhinostomy, Hemorrhage, Mucocele, Nasal mucosa

INTRODUCTION

Inflammation of the lacrimal sac is known as dacryocystitis.¹ In most cases, it is due to the obstruction of nasolacrimal duct (NLD), thereby leading to stagnation of tears within the lacrimal sac and consequent inflammation of the sac. Nearly 70% obstructions occur at the level of the

junction of the lacrimal sac and the NLD. The symptoms of NLD obstruction include persistent watering, mucoid or mucopurulent discharge, chronic conjunctivitis and appearance of sac swelling in the medial canthal area.² The incidence of NLD obstruction is approximately 10% at 40 years, increasing to 35-40% at 90 years of age.³ Females show a higher prevalence of dacryocystitis as compared to males. Cases of chronic dacryocystitis show a variable microbiological flora. Reports from the Indian subcontinent show a predominance of *streptococcus pneumoniae*, *Staphylococcus aureus* and *staphylococcus epidermidis* in cases of dacryocystitis.

Dacryocystorhinostomy (DCR) is the surgical treatment of choice for the management of chronic dacryocystitis. It

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aims to make an epithelium-lined tract between the lacrimal sac and the nasal mucosa, by suturing together the lacrimal sac flaps and the nasal mucosal flaps, thereby forming a new conduit and bypassing the site of obstruction. DCR can be performed by external approach, trans-canalicular (laser DCR) or the endonasal approach. The external approach was first introduced in 1904 by a French ophthalmologist Toti.⁴ Toti's procedure involves excision of the medial wall of the lacrimal sac, removal of the bony lacrimal fossa and anterior lacrimal crest, and making an opening in the nasal mucosa. The suturing of anterior and posterior flaps of lacrimal sac with corresponding flaps of nasal mucosa was independently suggested by Dupuy-Dutemps and Bourguet in France and Ohm in Germany in 1920s.^{5,6} Suturing of a rubber catheter into the sac was suggested by Iliff.⁷ The use of silicone tube in dacryocystorhinostomy was introduced by Older.⁸ The surgical procedure has undergone numerous modifications over the years, but the basic premise remains the same. External DCR enjoys a high success rate of 90-95%.⁹ Thus, the conventional external DCR remains the surgical treatment of choice to relieve obstruction beyond the common canaliculus.¹⁰ The common causes of failure include closure of the bony ostium, unrecognized common canalicular obstruction, and post-operative soft tissue infection. The success of external DCR demands good anatomical exposure of the deeply seated lacrimal sac, preparation of an adequately sized bony ostium, and gentle handling of the fragile lacrimal sac and nasal mucosal flaps, along with proper apposition of the flaps. All of this has to be accomplished in an extremely restricted surgical field. In order to simplify the surgical maneuverability, without compromising on the anatomical anastomosis, a modification of the classical technique has been attempted by excising both the posterior flaps and opposing the anterior lacrimal sac flap with the anterior nasal mucosal flap. The present study was undertaken to assess and compare the efficacy of single-flap (only anterior flap) versus double-flap (both anterior and posterior flap) anastomosis technique of external DCR in the management of chronic dacryocystitis.

MATERIALS AND METHODS

Our study was a prospective, interventional study of 90 patients, who were suffering from chronic dacryocystitis. The study was conducted at the Department of Ophthalmology, R. D. Gardi Medical College, Ujjain, over a period of 18 months, from July 2013 to December 2014. The study protocol was approved by the local and Institutional Ethics Committee. All the patients were explained in detail about the nature of the study, and written informed consent was taken from all those who were enrolled.

The patients were divided into two groups: Group A (45 patients who underwent single-flap DCR surgery) and Group B (45 patients who underwent double-flap DCR surgery).

Exclusion Criteria

The patients <20 years of age, patients with common canalicular and individual canalicular obstruction, post-traumatic cases, chronic dacryocystitis cases with fistula formation, prior failed DCR surgery cases, patients with nasal abnormalities and those with an acute attack of dacryocystitis were also excluded.

Preliminary data of the patient was recorded first, such as name, age, sex, address, and occupation. History of diabetes, hypertension, ischemic heart disease, and any bleeding disorder, history regarding use of antiplatelet or anticoagulant medication was elicited. Chief complaints were recorded. Anterior segment examination was done with torch light and slit lamp. Lacrimal apparatus was examined in detail especially looking for swelling or fistula in the sac area. Lacrimal puncta were examined for stenosis. Regurgitation on pressure over the sac area was elicited. Syringing and probing was performed in all the patients. Ear, nose, and throat referral was done to rule out nasal pathologies such as deviated nasal septum, hypertrophied inferior turbinate, atrophic rhinitis, and nasal polyps.

Routine pre-operative laboratory investigations done included complete blood count, random blood sugar, testing for HIV and hepatitis B surface antigen, blood pressure recording, and electrocardiography. The pre-anesthetic check-up was done in all patients as surgery was done under local anesthesia along with sedation. Pre-operatively, the patient was started on topical antibiotic eye drops q.i.d., along with nasal decongestant drops t.i.d. 1 week prior to surgery. The surgical procedure of DCR was done as single-flap or double-flap anastomosis, depending on the assigned group of the patient. All surgeries were performed by a single surgeon.

Surgical Technique

The patient was sedated by the anesthetist using intravenous midazolam. Local anesthesia (2% xylocaine with adrenaline 1:200,000 + 0.5% bupivacaine and hyndase) was injected at the surgical site. Anterior nasal packing with roller gauze soaked in 4% xylocaine and adrenaline was done 10 min prior to the commencement of surgery.

A 12-15 mm long skin-deep incision was given, 10 mm away from the medial canthus, taking care to avoid the angular vein. The orbicularis was separated by blunt dissection. The medial palpebral ligament was identified and incised, thereby exposing the lacrimal sac. The periosteum was incised and

reflected. Bony ostium measuring approximately 15 mm × 15 mm was fashioned by successive punches from the Citelli's bone punch. The bony ostium extended anteriorly 5 mm anterior to the anterior lacrimal crest, posteriorly up to the posterior lacrimal crest, superiorly up to the level of medial palpebral ligament and inferiorly to the inferior orbital rim. The Bowman's probe was passed through the lacrimal punctum to tent up the lacrimal sac.

In patients assigned to Group A (single-flap anastomosis), large U-shaped, anterior lacrimal, and anterior nasal mucosal flaps were fashioned. The small remaining posterior flaps of the lacrimal sac and nasal mucosa were excised. The large anterior flap of the lacrimal sac was sutured to the anterior flap of nasal mucosa using 6/0 vicryl sutures.

In patients assigned to Group B (double-flap anastomosis), an H-shaped incision was given over the tented lacrimal sac, and a similar H-shaped incision was also given over the exposed nasal mucosa, thereby fashioning almost equal-sized anterior and posterior flaps. The respective flaps were then sutured together using 6/0 vicryl sutures.

Remaining procedure was the same for both Group A and Group B. The wound was closed in layers using 6/0 vicryl. The skin incision was closed using either interrupted or continuous subcuticular 6/0 silk sutures. Lacrimal syringing was done at the end of the procedure to confirm patency of the anastomotic passage. Nasal packing was not routinely done post-operatively.

Post-operative regimen consisted of topical antibiotic eye drops q.i.d and nasal decongestant drops t.i.d for 1 week. Oral antibiotic and analgesic medications were given for 5 days.

Follow-up examination was done on the 1st post-operative day followed by the 7th post-operative day when skin sutures were removed. Subsequently, the patient was called for follow-up at the completion of 1 month, and 3 months post-operatively.

At each follow-up, the patient was asked about the persistence or recurrence of epiphora, presence of ocular mucoid or mucopurulent discharge or nasal bleeding. The surgical wound site was examined for wound gape (early follow-up) and hypertrophic scar (late follow-up). Lacrimal syringing was performed on all the patients at each follow-up visit to confirm patency of the surgical anastomosis.

Success of the surgical procedure was defined as symptomatic relief of epiphora as reported by the patient and patency of the anastomotic passage on lacrimal syringing at the time of final follow-up.

RESULTS

In our study, 90 patients suffering from chronic dacryocystitis were enrolled. These patients were divided into two groups: Group A (45 patients who underwent single-flap DCR) and Group B (45 patients who underwent double-flap DCR) for the ease of comparative study of the efficacy of both these procedures. In our study, 29 (32.22%) patients were males and 61 (67.77%) patients were females. 64 (71.11%) patients were in the age-group 31-60 years of age (Figure 1). Amongst these, 32 (35.55%) patients were in the age group 31-40 years.

In Group A, out of 45 patients who underwent the single-flap procedure, there were 12 (13.33%) males, and 33 (36.66%) females. In Group B, out of 45 patients, who underwent double-flap procedure, 17 (18.88%) patients were males and 28 (31.11%) patients were females (Table 1). Our study showed a preponderance of dacryocystitis in the females.

Dacryocystitis has varying modes of presentation and the same was found in our study. 62 (68.85%) of our patients had epiphora as the main presenting feature. Epiphora with mucocele was seen in 25 (27.77%) patients (Table 2). Three patients (3.33%) presented with an encysted mucocele.

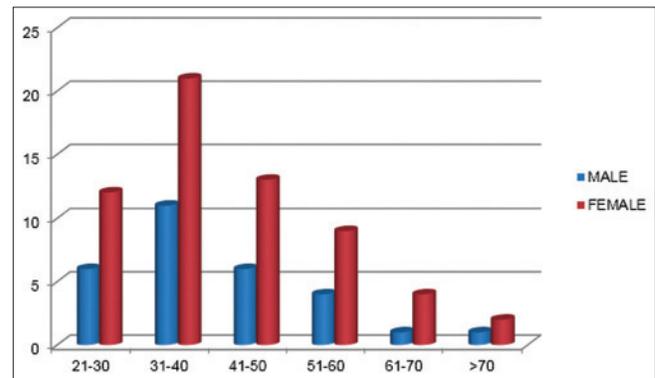


Figure 1: Age-sex distribution in study group (n = 90 patients)

Table 1: Gender-wise distribution in study group (n=90 patients)

Groups	Male (%)	Female (%)	Total
A	12 (13.33)	33 (36.66)	45
B	17 (18.88)	28 (31.11)	45
Total	29 (32.22)	61 (67.77)	90

Table 2: Presenting features in the study group (n=90 patients)

Presentation	Number of patients	Percentage
Epiphora only	62	68.88
Epiphora+mucocele	25	27.77
Encysted mucocele	03	3.33

DCR surgery is fraught with numerous complications, the main being intra-operative bleeding. In our study, severe hemorrhage was seen in 17 (18.88%) patients (Figure 2). Of these, 7 patients belonged to Group A, and 10 patients belonged to Group B.

In our study, the success of surgical outcome was determined by patency of the anastomotic passage on lacrimal syringing, and symptomatic relief of epiphora as reported by the patient. We did not find any significant difference in the surgical success rate of both Group A and Group B (single-flap versus double-flap procedure). The success rate was 93.33% in Group A and 97.77% in Group B ($P = 0.616$, not significant) (Table 3). Failure was seen in 6.66% in Group A, as compared to 2.23% patients in Group B. The overall surgical success rate of external DCR in our study was 95.56%.

DISCUSSION

Even with the advent of modern techniques of laser and endonasal DCR, external DCR still remains the gold - standard technique for the surgical management of chronic dacryocystitis, symptomatic relief to the patient. The pitfalls of external DCR are a slightly longer learning curve, the surgical difficulty in accessing small and fragile tissues in a restrained anatomical field and more intra-operative bleeding along with prolonged operative time.

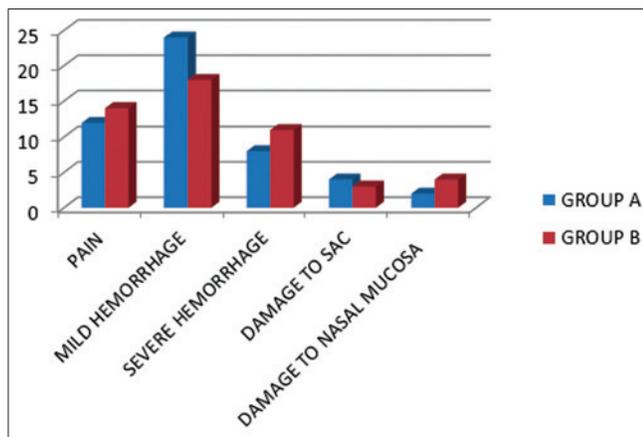


Figure 2: Intra-operative complications in study group (n = 90 patients)

Table 3: Surgical outcome in study group (n=90 patients)

Surgical outcome	n=45 (%)		Total
	Group A	Group B	
Success	42 (93.33)	44 (97.77)	86 (95.56)
Failure	03 (6.66)	01 (2.23)	4 (4.44)
Total	45 (100)	45 (100)	90 (100)

Hence, our study aimed to compare the efficacy and long-term success rate of the simpler technique of single-flap external DCR, with the classical technique of double-flap external DCR.

Faizal *et al.* in their study, found a male to female ratio of 1:2.5.¹¹ In our study, 29 (32.22%) patients were males and 61 (67.77%) patients were females. A female preponderance of 89.6% was shown by Ali and Ahmad.¹² A possible cause of this is a relatively narrow lower NLD in the females, along with hormonal changes in the middle age which cause a generalized de-epithelialization, thereby leading to obstruction by sloughed off debris. Another cause could be the use of cheap and adulterated cosmetics applied on the inner aspect of the lashes.¹³

Dubey *et al.* in their study had 65 (81.25%) patients >30 years of age.¹⁴ In our study, 71.11% patients were found to be in the age-group of 31-60 years of age. These results show a higher prevalence of dacryocystitis in patients between 30 and 60 years of age. These results again show us that chronic dacryocystitis should be carefully looked for in the middle-aged and elderly population.

In our study, 62 (68.85%) of our patients had epiphora as the main presenting feature. Epiphora with mucocele was seen in 25 (27.77%) patients. 3 patients (3.33%) presented with the encysted mucocele. These results are comparable with the study of Faizal *et al.* who found epiphora to be present in 78.6% of the patients.¹¹ These results show the presence of epiphora as the main presenting complaint in the majority of patients of chronic dacryocystitis.

Mat *et al.* in their study found a success rate of 95.4% in single-flap procedure, and a success rate of 95.2% in double-flap procedure.¹⁵ Baldeschi *et al.* anastomosed the anterior flaps only, and had a success rate of 100%.¹⁶ Serin *et al.* found a success rate of 93.75% with posterior-flap anastomosis and 96.67% with posterior flap excision.¹⁷ We also did not find any significant difference in the surgical success rate of both Group A and Group B (single-flap versus double-flap procedure). In our study, the success rate was 93.33% in Group A (single-flap procedure) and 97.77% in Group B (double-flap procedure). This result shows that the technically simple single-flap procedure of external DCR is as efficacious as the double-flap DCR in the management of chronic dacryocystitis.

CONCLUSION

Chronic dacryocystitis is a fairly common problem causing troublesome epiphora. There are many surgical modalities of managing chronic dacryocystitis. However, external

DCR remains the mainstay of treatment with a high success rate. In our study, we found that the simpler technique of single-flap anastomosis yields comparable results to the technically demanding double-flap anastomosis in DCR surgery.

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Evaluation of Relation between Bizygomatic Width and Mesiodistal Dimension of Maxillary Central Incisor in Indian Population: An *In Vivo* Study

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Abstract

Introduction: One of the primary concern in denture esthetics is the selection of the anterior teeth, correct proportion is essential for harmony and facial rhythm. Loss of teeth not only affects facial appearance but also creates psychological trauma to person, hence it is essential that an esthetically pleasing and functionally comfortable replacement of the missing should be provided. There are various methods available for selection of teeth, i.e. golden proportion bizygomatic width, intercommissural width, interalar width and interpupillary. However, no universally accepted parameter currently exist for the selection of anterior teeth in Indian population.

Purpose: The purpose of my study is to evaluate the relation between bizygomatic width and dimension of a maxillary central incisor in Indian population.

Materials and

Methods: A sample size of 200 subjects (100 males and 100 females) were selected according to criteria. Facial measurement is done with the help of face bow and dental measurement done with the help of veneer caliper.

Results: According to present study dental measurement in male and female showing highest percentage co-incidence with pound's formulae with a less standard error of measurement. Comparison of the bizygomatic width of male and female showed male have a larger width than female. Comparison between the mesiodistal dimension of central incisor between male and female and it is found that male have a larger dimension than female with a mean of 8.51 mm. Correlation between facial and dental measurement using Pearson's correlation coefficient showed the relation between the measured value of central incisor by pound's formulae and by digital veneer caliper.

Conclusion: According to the current study, it is concluded that the correlation between Pound's formula and the measured value is positive. There was only limited research in the literature on bizygomatic width as a guide for selection of anterior teeth, so future research should focus on this measurement.

Key words: Denture esthetic, Facial rhythm, Golden proportion, Pound's formulae

INTRODUCTION

One of the primary concerns in the aesthetic forefront of dentures is the selection of the anterior teeth; a correct

proportion is essential for harmony and facial rhythm. Loss of teeth affects an individual's facial appearance besides creating psychological trauma to the person. Hence, it is essential that an aesthetically pleasing and functionally comfortable replacement of the missing teeth be provided. According to Young, it is apparent that beauty, harmony, naturalness, and individuality are major qualities of aesthetics.¹

In order to attain a pleasing aesthetic appearance, the maxillary anterior teeth must be in proportion to facial morphology.^{2,4} Several anatomic measurements such as

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the intercommissural width, bizygomatic width, inter-alar width, and interpupillary distance have been proposed to aid in determining the correct size of the anterior teeth. The calculation of the dimension of the maxillary anterior teeth for an edentulous patient in the absence of pre-extraction records is a rather onerous task. There are various methods available for selection of teeth, i.e. golden proportion (1.618:1),^{4,6} bizygomatic width, intercommissural width, interalar width and interpupillary.⁷⁻¹¹

Early work on tooth size used to be based on complete denture fabrication and had a negligible scientific foundation. Examples of such work include the “temperamental theory”¹² where the practitioner determines the tooth form based on the patients’ health and appearance. This hypothesis had been in use in the late 19th century and was replaced by a system using the facial form to determine the tooth form, although this was later discredited. Frush and Fisher¹³ introduced the dentogenic theory in the late 1950s using the “sex, personality, age (SPA) factor” in selecting denture teeth. Dentogenics uses subtle changes in tooth arrangements to reflect the SPA factors, such as mimicking ageing by increasing abrasion and spacing. This theory still has some advocates. Conflicting evidence exists in the literature on tooth size. The size of the central incisors as a proportion of skull measurements has been used, including length (1/20 skull length) and width (1/16 bizygomatic width).

However, no universally accepted parameter currently exists for the selection of anterior teeth in the Indian population.

Hence, the purpose of this study is to evaluate the authenticity of the relation of bizygomatic width with maxillary central incisor in the Indian population.

MATERIALS AND METHODS

A sample population of 200 subjects (100 males and 100 females) was selected from Datta Meghe Institute Medical Science, Sawangi (Meghe), Wardha, Maharashtra, according to the inclusion criteria.

Inclusion Criteria

1. They should be Indian
2. They should have all permanent maxillary anterior and premolar teeth
3. They should have no history of orthodontic treatment
4. They should not have more than one full or one three fourth crown in maxillary anterior and premolar teeth
5. They should not have proximal restorations that grossly affected the width of maxillary anterior teeth

6. They should be above 18 years of age, so facial growth was complete
7. The corner of the mouth should be situated superiorly to the occlusal horizontal plane
8. There should be no interdental spacing or crowding.

Data Collection

Each subject was seated in a dental chair with the head upright supported by the headrest, so as to enable them to face forward on the horizon, with the occlusal plane of the maxillary teeth parallel to the floor.

Facial Measurement

Bizygomatic width is measured between two most prominent point on the zygomatic bone with the help of face bow (Figure 1).

Dental Measurement

Mesiodistal dimension of maxillary central incisor is measured between interproximal contact points with the help of a vernier caliper (Figure 2).



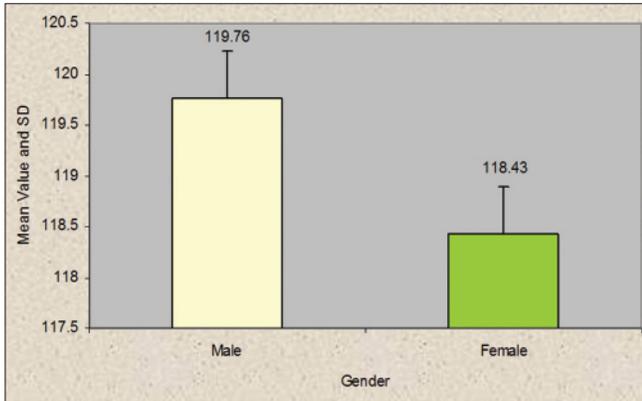
Figure 1: Measurement of bizygomatic width between two most prominent point on zygoma



Figure 2: Measurement of width of central incisor by digital veneer caliper

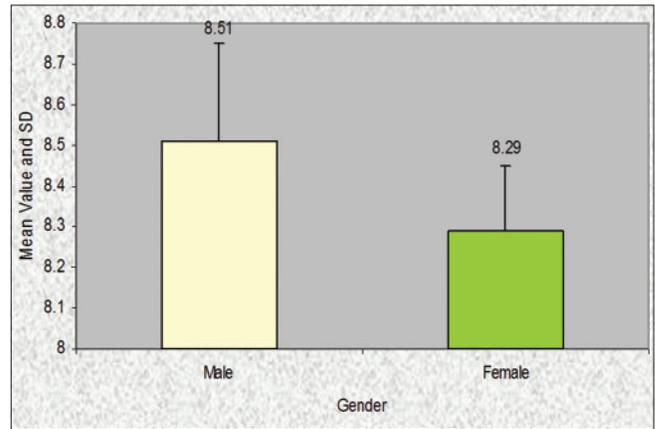
RESULTS

According to the present study, dental measurements in males and females show the highest percentage co-incidence with Pound's formulae (Table 1), with a less standard error of measurement. In Table 2 and a comparison of bizygomatic widths of males and females is depicted, thus showing the male having larger widths (mean = 119.76 mm) as compared to females (mean = 118.43 mm). Graph 1 depicts the bar diagram of the same. Table 3 and a portrays



Graph 1: Comparison of facial measurement in male and female

a comparison between the mesiodistal dimensions of central incisors between males and females, again showing that males have larger dimensions than females, with a mean of 8.51 mm (Graph 2). Table 4 shows a correlation between facial and dental measurements using Pearson's correlation coefficient (Graph 3a and 3b). Table 1 the portrays a comparison between the values of the central incisors, measured using the pound's formula and the digital veneer caliper (Graph 4).



Graph 2: Comparison of dental measurement in male and female

Table 1: Actual between dental measurement and pound's formulae

Gender	Mean	SD	N	% difference	SE	P
Male						
Dental measurement	8.50	0.23	100	13.17	0.02	0.0004 S, P<0.05
Pound's formulae	7.38	0.02	100			
Female						
Dental measurement	8.29	0.16	100	10.85	0.01	0.0005 S, P<0.05
Pound's formulae	7.39	0.03	100			

SD: Standard deviation, SEM: Standard error

Table 2: Comparison of facial measurement in male and female descriptive statistics

Gender	N	Mean	SD	SEM
Male	100	119.76	0.47	0.04
Female	100	118.43	0.46	0.04

SD: Standard deviation, SEM: Standard error of mean

Table 2a: Student's t-test

T	df	P-value	Mean difference	SE difference	95% CI of the difference	
					Lower	Upper
20.11	198	0.000 S, P<0.05	1.33	0.06	1.20	1.46

CI: Confidence interval, SE: Standard error

Table 3: Comparison of dental measurement in male and female descriptive statistics

Gender	N	Mean	SD	SEM
Male	100	8.51	0.24	0.02
Female	100	8.29	0.16	0.01

SD: Standard deviation, SEM: Standard error of mean

Table 3a: Student's t-test

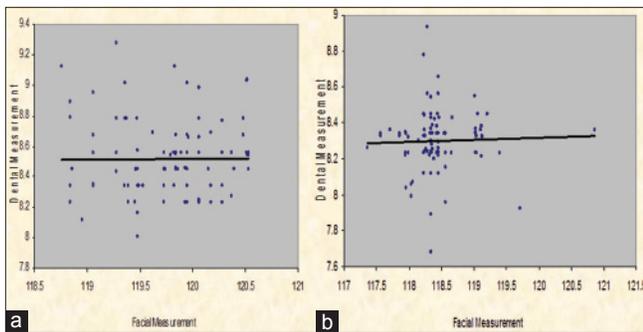
T	df	P-value	Mean difference	SE difference	95% CI of the difference	
					Lower	Upper
7.36	198	0.000 S, P<0.05	0.21	0.02	0.15	0.27

CI: Confidence interval

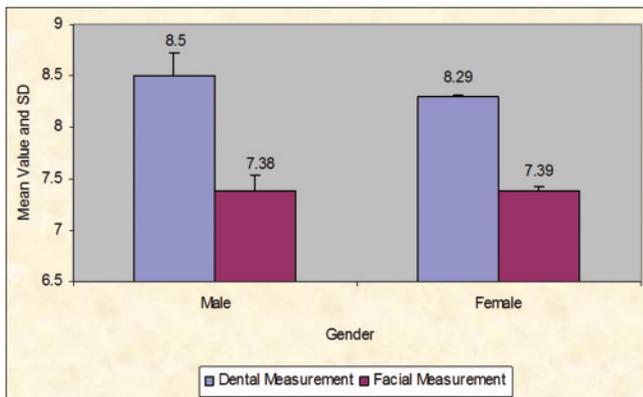
Table 4: Correlation coefficient between facial and dental measurement Pearson's correlation coefficient

Gender	Mean	SD	N	Correlation "r"	P value
Male					
Facial measurement	119.76	0.47	100	0.007	0.94 NS, P>0.05
Dental measurement	8.51	0.24	100		
Female					
Facial measurement	118.43	0.46	100	0.03	0.719 NS, P>0.05
Dental measurement	8.29	0.16	100		

SD: Standard deviation, NS: Non-significant



Graph 3: (a) Correlation coefficient between facial and dental measurement: male, (b) Correlation coefficient between facial and dental measurement: female



Graph 4: Actual between dental measurement and Pound's formulae

DISCUSSION

In general, every population is genetically diverse due to geographical location and historical background, giving rise to many dental and facial variations. Therefore, information regarding tooth norms groups may prove useful to clinicians when restoring anterior teeth. The size and morphology of the maxillary anterior teeth have been studied in the past to enable the charting of racial norms and gender characteristics. In earlier studies, measurements were made using extracted teeth. However, recent investigations attempted to measure the clinical tooth dimensions either on casts or using computer-based images or intraoral evaluations in most of these studies, the width of the maxillary central incisor was used to assess racial and gender differences.

Gender variations in the dimensions of the anterior teeth have been noted for most racial groups, with men exhibiting wider anterior teeth than women. Gillen *et al.*¹⁴ reported that the maxillary anterior teeth of men were wider and longer than those of women in both white and black populations. Similarly, Sterrett *et al.*¹⁵ reported the mean width and length of the clinical crowns of the maxillary anterior teeth of men to be significantly

greater than the corresponding dimensions in women in a white population. Owens *et al.*¹⁶ measured the width of the maxillary central incisor in several racial groups and noted variations in most of them, with men again having wider central incisors than women. In the present study, the mean width values for the central incisors ($P = 0.05$) for men were significantly greater than the corresponding dimensions for women; these findings are in agreement with the results of related studies.

The relationship between the width of a central incisor and the bizygomatic width (1:16) is commonly used to determine the size of the maxillary anterior teeth. Cesario and Latta found that a ratio of 6.6, which had previously been proposed, existed between the interpupillary distance and the central incisor width in white men and women, and also in black women. Recently, in a study by Latta *et al.*,¹⁰ the relationships among the width of the mouth, the interalar width, the bizygomatic width, and the interpupillary distance were evaluated. It was concluded that these relationships might be used as references if applied in combination, although racial and gender differences were detected when anatomic measurements were evaluated individually. Forrest *et al.* reported that there is a correlation between bizygomatic width and maxillary central incisor, but it is not of sufficient magnitude to justify the use. Hasanreisoglu *et al.*¹⁷ stated that the relationship between bizygomatic width and width of central incisor occurred mostly in females. Boucher stated that tooth selection made by this procedure must be considered as being very tentative.

The present study also shows a correlation between pound's formulae and bizygomatic width.

CONCLUSION

Within the limitations of the present study, the following conclusions have been drawn:

Comparison of all the mean values between males and females reveal.

- Mean bizygomatic width and width of central incisor were greater in males. According to the current study, it is concluded that the correlation between Pound's formula and the measured value is positive
- There was only limited research in the literature on bizygomatic width as a guide for selection of anterior teeth, so future research should focus on this measurement
- Furthermore, new methods should be found to standardize the measurement of the bizygomatic width.

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Effects of Cigarette Smoking on Adult Male Seminal Fluid: A Retrospective Study

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Abstract

Background: Cigarette smoking is associated with many systemic health problems. Controversial results were found on the effect of cigarette smoking on seminal analysis of infertile males. The aim of the present study is to evaluate the effects of cigarette smoking on seminal fluid examination of adult infertile males.

Materials and Methods: We enrolled 329 adult infertile male partners of the couples experiencing infertility. The patients were divided into two groups: Group I (non-smokers, $n = 211$) who ceased smoking >6 months prior to data collection and Group II (smokers, $n = 118$) who smoked within 6-month time frame. However, we further divided Group II into Group IIa (non-heavy smokers, $n = 57$) who smokes <20 cigarettes per day and Group IIb (heavy smokers, $n = 61$) who smokes more than 20 cigarettes per day. Seminal fluid was obtained according to the standard protocol and examined as per WHO guidelines.

Results: Out of 329 males, 211 were observed to be non-smokers and 118 were addicted to cigarette smoking. We observed abnormal morphology (%) in Group I and Group II as 56 ± 6.45 and 72 ± 7.51 , respectively ($P = 0.001$). Statistically, significant results were observed on examining forward progressive motility (%) in between the groups (61 ± 8.72 and 44.56 ± 7.61 ; $P = 0.001$). The concentration of sperms in the seminal fluid and the increase in leukocyte count was significantly greater in non-smokers than smokers ($P = 0.001$).

Conclusion: Smoking causes detrimental and harmful effects on human adult male seminogram.

Key words: Cigarette smoking, Male Infertility, Semen Analysis

INTRODUCTION

Cigarette smoking is a common addiction spreading worldwide and affecting large scale of global population. According to recent World Health Organization (WHO) estimates 8% of the world's population is suffering from infertility and the prevalence of smoking estimated worldwide among young adult males is 46%.¹

In 40% of the couples visiting infertility clinics, male infertility is also a very common cause.² Although various

underlying diseases and anatomical abnormalities are the leading causes for male infertility but some of the cases are still undiagnosed regarding the cause of male infertility. Based on this fact, it had led to the researchers to observe other parameters like diet, environmental changes, and occupational hazards for male infertility.² Cigarette smoking has proven to be a culprit for male infertility in the recent past. The major constituents that is harmful for the health during cigarette smoking is nicotine and tar in the particulate form and carbon-mono-oxide in gaseous form.³

The exact mechanism of compromising male fertility by cigarette smoking is still unknown. Recent researches showed that cigarette smoking decreases the function of sertoli and leydig cells and also causes a negative effect on testicular microcirculation.⁴ Extensive medline search revealed studies that cigarette smoking has a negative effect on human sperm. The sperms of smokers are less in number, abnormal morphology, and with poor

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viability. Some studies revealed that cigarette smoking causes decreased the sperm concentration, motility, and morphology.⁵⁻¹⁰ Male cigarette smoking causes severe damage to DNA, prevents fertilization of ovum, implantation problems, and poor development of the embryo.¹¹ A large amount of single/double stranded DNA with decreased fertilizing capacity of sperms was observed in a group of smoking individuals.¹²

Many studies are found comparing the effects of cigarette smoking on human seminal parameters but still in convincing and conflicting results are observed. Based on these facts, we planned to frame a retrospective study comparing the effects of cigarette smoking on human seminogram. Moreover, we also aim to distinguish the seminal parameters of non-heavy smokers and heavy smokers.

MATERIALS AND METHODS

This study was conducted at the Department of Pathology TMMCRC, Moradabad, India. We enrolled 329 patients from January to May 2015 and conducted a retrospective study on male partners of the couples experiencing infertility. We excluded the male patients with a history of sexual transmitted diseases, surgery for an inguinal hernia, orchidopexy or any scrotal surgery. Male patients with chronic medical illness (renal, liver, hypertension, diabetes mellitus, etc.) and with abnormal genital examination (hydrocele, varicocele, and ectopic testes) were also excluded from the study.

The patients were divided into two groups: Group I (non-smokers, $n = 211$) who ceased smoking >6 months prior to data collection and Group II (smokers, $n = 118$) who smoked within 6-month time frame. However, we further divided Group II into Group IIa (non-heavy smokers, $n = 57$) who smokes <20 cigarettes per day and Group IIb (heavy smokers, $n = 61$) who smokes more than 20 cigarettes per day.

Seminal fluid (2-5 ml) was collected in a wide bore sterile container by masturbation after 3 days of abstinence in a separate room near to the laboratory. The sample with volume <1 ml was rejected from the study protocol. All samples were liquefied at 37°C and the samples were analyzed at room temperature by a trained pathologist.

Semen analysis was performed under light microscopy and categorized according to WHO guidelines: sperm concentration $\geq 20 \times 10^6$ per ml, semen volume ≥ 2 ml, sperm count $> 40 \times 10^6$ sperm, sperm motility $> 50\%$ forward progression and morphology $> 15\%$ normal.¹³

All the parametric data were analyzed using Student's t-test and non-parametric data using Chi-square or Fisher test whichever is applicable. Data was analyzed using Statistical Package for Social Sciences version 19.0. A P value of < 0.05 was considered statistically significant.

RESULTS

A total of 329 adult males were successfully included in our study. No significant difference in demographic characteristics was observed in between the two groups (Table 1).

Out of 329 males, 211 were observed to be non-smokers and 118 were addicted to cigarette smoking. The volume and pH of seminal fluid ejaculated were found to be insignificant on comparing both the groups ($P = 0.76$ and $P = 0.99$, respectively). Table 2 reveals that abnormal morphology (%) in Group I and Group II was 56 ± 6.45 and 72 ± 7.51 , respectively ($P = 0.001$). Statistically significant results were observed on examining forward progressive motility (%) in between the groups (61 ± 8.72 and 44.56 ± 7.61 ; $P = 0.001$). The concentration of sperms in the seminal fluid was significantly greater in non-smokers than smokers ($P = 0.001$). We also observed seminal fluid leukocyte count significantly increased in patients addicted to smoking ($P = 0.001$) (Table 2 and Figure 1).

We also categorized 118 adult cigarette smoking males into non-heavy smokers and heavy smokers. 57 and 61 males were included in non-heavy smokers and heavy smokers respectively. Statistical insignificant results were observed on comparing volume and pH of the seminal fluid in Group IIa and Group IIb ($P = 0.97$ and 0.99 , respectively) (Table 3 and Figure 2). The patients smoking more than

Table 1: Demographic characteristics (mean \pm SD)

Demographics	Group I	Group II	P value
Age	34.89 \pm 6.23	35.51 \pm 5.64	0.37
Weight	71.57 \pm 7.38	72.25 \pm 6.93	0.41
Height	168.85 \pm 8.51	167.84 \pm 8.19	0.29

SD: Standard deviation

Table 2: Seminal fluid characteristics (mean \pm SD)

Variables	Group I (n=211)	Group II (n=118)	P value
Volume (mean \pm SD)	2.96 \pm 2.04	2.89 \pm 1.98	0.76
Seminal fluid pH	7.64 \pm 0.01	7.64 \pm 0.01	0.99
Abnormal morphology (%)	56 \pm 6.45	72 \pm 7.51	0.001*
Forward progressing motility (%)	61 \pm 8.72	44.56 \pm 7.61	0.001*
Concentration $\times 10^6$ (mean \pm SD)	46.8 \pm 22.5	34.4 \pm 17.98	0.001*
Seminal fluid leukocyte count increased (%)	41 \pm 6.83	55 \pm 5.56	0.001*

* $P < 0.05$, SD: Standard deviation

20 cigarettes per day has more abnormal morphology (%) in semen sample (69 ± 4.51) than those smoking <20 cigarettes per day (63 ± 7.68) ($P = 0.001$). The motility (%) of the sperms was observed to be significantly better in Group IIa (48 ± 6.37) than Group IIb (33 ± 5.91) ($P = 0.001$) (Table 3 and Figure 2). The concentration of sperms in Group IIa (37.71 ± 20.02) was found to be significantly greater than Group IIb (29.95 ± 18.26) ($P = 0.001$) (Table 3 and Figure 2).

DISCUSSION

In our study, 118 individuals were smokers out of 329 infertile men. However, most of the adults are between the age group of 32-36 years which is contradicting from

the study by Trummer *et al.*¹⁴ who enrolled young adults (20-24 years) in their study.

We observed an insignificant difference of volume and pH of seminal fluid between the smokers and non-smokers. These findings were supported by Meri *et al.*¹⁵ who also observed comparable results of volume and pH of seminal fluid among smokers and non-smokers. A larger amount of abnormal morphology sperms was found in a group involved in smoking. Abnormal sperms could be because of the fact that smoking causes increased DNA fragmentation and leads to more number of single/double stranded DNA.¹² Abnormal morphology was also observed by Meri *et al.*¹⁵ in their while comparing smokers with non-smokers. However, Aghamohammadi and Zafari,¹⁶ and Trummer *et al.*¹⁴ did not observed any significant difference in sperm morphology on comparing smokers and non-smokers.

Table 3: Seminal fluid characteristics between non heavy smokers and heavy smokers (mean±SD)

Variables	Group IIa (n=57)	Group IIb (n=61)	P value
Volume (mean±SD)	2.91±1.84	2.90±1.79	0.97
Seminal fluid pH	7.64±±0.01	7.64±0.01	0.99
Abnormal morphology (%)	63±7.68	69±4.51	0.001*
Forward progressing motility (%)	48±6.37	33±5.91	0.001*
Concentration×10 ⁶ (mean±SD)	37.71±20.02	29.95±18.26	0.03*

*P<0.05, SD: Standard deviation

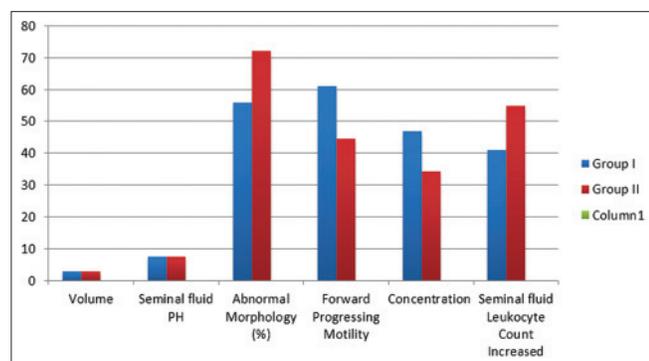


Figure 1: Semen analysis characteristics of non-smokers and smokers

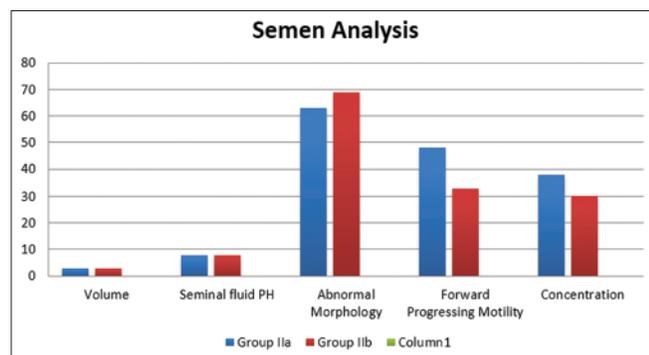


Figure 2: Semen analysis characteristics of non-heavy smokers and heavy smokers

Our study also reveals a significant decrease in sperm motility in smoking individuals. However, Meri *et al.*¹⁵ similarly observed a decrease in Types I and II motility but increase in Type IV motility in smoking candidates. These findings are consistent with other studies.¹⁷⁻²¹ Ozgur *et al.*²² and Collodel *et al.*²³ observed no change in motility of sperms on comparing between smokers and non-smokers. The concentration of sperms was found to be significantly more in non-smoking individuals. Chia *et al.*²⁴ and Merino *et al.*²⁵ also observed decrease in concentration of sperms in smoking individuals. However, Aghamohammadi and Zafari¹⁶ did not observed any significant change in concentration of sperms in seminal fluid.

The uniqueness is that we also observed leukocyte count in seminal fluid in our study. Significant increase in leukocyte count was found in smoking individuals as compared to non-smoking males. The increase of leukocyte could be attributed from the fact that tobacco metabolites in cigarettes causes inflammatory reaction and thus leads to the formation of inflammatory mediators, thereby increasing the leukocytes in seminal fluid.²⁶ Elevated leukocytes are the major source of oxygen free radicals and these reactive oxygen species causes impairment in male fertility.²⁷ These reactive oxygen species causes oxidative injury to DNA and membrane phospholipids.²⁷ Our findings were also supported by Meri *et al.*¹⁵ who also reported significant increase in leukocyte count in smoking infertile males.

We also compared seminal parameters of non-heavy smokers with heavy smokers and observed abnormal morphology, decreased sperm concentration and decreased motility of sperms in infertile males smoking more than 20 cigarettes per day. These findings were further supported by

Meri *et al.*¹⁵ also observed similar deranged seminal profile in individuals smoking more than 20 cigarettes per day. However, Collodel *et al.*²³ similarly observed a decrease in seminal concentration in heavy smokers but they did not observed abnormal morphology and decreased motility in their study group. This could be attributed from the fact that the study group by Collodel *et al.*²³ was small compared to our study.

Our study carries a limitation that we should have also measured hormonal levels like testosterone, follicle stimulating hormone, luteinizing hormone, estradiol to make it more impactful as measured by Trummer *et al.*¹⁴ However, due to financial constraints and institutional limitations we could not able to perform thorough hormonal analysis.

CONCLUSION

From our study, we conclude that cigarette smoking has a detrimental effect on seminal fluid parameters in infertile males. Moreover, seminogram of heavy smokers are more deranged as compared to males smoking <20 cigarettes per day. Thus, we conclude that not only omitting cigarette smoking but even decreasing the number of cigarettes per day improves the seminal profile.

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Comparative Study on Antibiotic Resistance Profile of Extended-Spectrum Beta-Lactamase and Non-Extended-Spectrum Beta-Lactamase *Escherichia coli* Infections among Pediatric Population with Community-Acquired Urinary Tract Infections in a Tertiary Care Centre.

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Abstract

Introduction: Increasing the prevalence of antimicrobial resistance due to the production of extended-spectrum beta-lactamase (ESBL) among bacterial pathogens specifically *Escherichia coli* in community-acquired urinary tract infection (UTI) is a concern. Studies on ESBL *E. coli* in CA pediatric UTI are limited.

Objectives: To compare antibiogram and thereby antibiotic resistance pattern between ESBL and non-ESBL *E. coli* isolates in children with CAUTI.

Methods: Prospective study conducted from November 2012 to January 2015 in a tertiary care pediatric center. *E. coli* in urine cultures from children aged ≤ 18 years was identified by standard biochemical reactions and antibiotic susceptibility tested by Kirby-Bauer disc diffusion. ESBL production was determined by double-disc diffusion method using ceftazidime (30 mcg) and ceftazidime-clavulanic acid (30 mcg/10 mcg) and confirmed by E-test using triple ESBL detection kit. Antibiograms were compared for statistical significance.

Results: A total of 385 isolates with culture-proven *E. coli* CAUTI were included. Of these, 159 (41.3%) were ESBL positive. Overall, resistance to multiple classes of antibiotics were noted among *E. coli* isolates including ampicillin (69.9%), co-trimoxazole (56.9%), cefixime (84.4%), ceftazidime (85.7%), ciprofloxacin (60.5%), and gentamicin (31.7%). The association between ESBL production in *E. coli* and drug resistance was significant for ceftazidime (0.000), cefixime ($P = 0.000$), cefotaxime ($P = 0.037$), ceftazidime-clavulanic acid ($P = 0.000$), and levofloxacin ($P = 0.018$).

Conclusion: There is a need for continued monitoring of antimicrobial susceptibility of *E. coli* isolates in community-acquired pediatric UTI. ESBL confirmatory tests should be part of routine antibiotic susceptibility testing, and ongoing local epidemiological surveillance is critical to monitor variability in resistance pattern.

Key words: Cephalosporins, Clavulanic acid, Extended-spectrum beta-lactamase, *Escherichia coli*, Quinolones

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INTRODUCTION

Urinary tract infection (UTI) is one of the most common childhood bacterial infections and *Escherichia coli* is the most common organism causing acute infection across all age groups. Treatment of UTI has become complex because of increasing bacterial resistance to trimethoprim-

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sulfamethoxazole (co-trimoxazole), cephalosporins, fluoroquinolones, and other standard primary antibiotics. Extended-spectrum beta-lactamases (ESBL) are enzymes which confer microbial resistance to penicillins, third generation cephalosporins and aztreonam, and there is the emergence of ESBL, especially in Enterobacteriaceae. There is a requirement for hospitalization and parenteral treatment with higher antibiotics like carbapenems in the presence of ESBL-producing bacteria in pediatric UTI resulting in financial burden. Although there is growing concern about emergence of antibiotic resistance, data on resistance trends of pediatric uropathogens are few.¹

The ESBL-producing strains specifically *E. coli* are becoming increasingly resistant to non-beta-lactam antibiotics, leading to therapeutic failures.² Data about clinical isolates which produce ESBL in childhood UTI is limited.³ It was considered that ESBL-producing organisms were predominantly restricted to healthcare facilities, but recent reports suggest that it is prevalent in the community also.^{4,6} There is no data concerning the antibiogram of ESBL *E. coli* isolated from community-acquired pediatric UTI from this part of the country. To decide on initiation of empiric therapy, there should be awareness about the local antibiotic resistance pattern of the common causative agents of UTI. Hence, this study aims to determine the emergence of ESBL *E. coli* in pediatric patients and compare antibiogram, and thereby antibiotic resistance pattern between ESBL and non-ESBL *E. coli* isolates in children with community-acquired pediatric UTI.

METHODS

Setting

The present study was carried out in the central clinical microbiology laboratory of a tertiary care hospital with a large out- and in-patient pediatric facility in Kerala, India. The study was conducted after due approval from the Institutional Ethics Committee and informed consent obtained from either of the parent.

Study Design

It is a prospective microbiological study of *E. coli* isolates from urine specimens of pediatric patients with suspected CAUTI who attended out-patient department between November 2012 and January 2015. Isolates were those of children aged ≤ 18 years with culture-proven UTI as defined by American Academy of Pediatrics and excluding healthcare-associated infection.^{7,8} Significant bacteriuria was defined as growth of a single pathogen $>10^5$ CFU/ml in midstream catch, $>10^4$ CFU/ml in catheterized, or any growth obtained by a suprapubic aspiration. Isolates excluded were those with healthcare-associated UTI defined

as follows: (i) Infection during >48 h hospitalization or within 48 h of discharge, (ii) hospitalization during 90 days preceding culture, (iii) children with chronic systemic illnesses, (iv) on intravenous therapy or specialized wound care, (v) on hemodialysis or antineoplastic chemotherapy within 30 days, and (vi) residing in a nursing home or transferred from another hospital. Bag collected samples and mixed cultures were excluded from the study.

Sample Collection and Processing

Cultures were obtained by midstream catch, bladder catheterization or suprapubic aspiration. Urine microscopy was performed. Semi-quantitative urine culture was done using calibrated loop method. A loopful (0.001 ml) of well mixed un-centrifuged urine was inoculated onto the surface of MacConkey and blood agar. The culture plates were incubated aerobically at 37°C for 18-24 h and bacterial count were expressed as CFU/ml. *E. coli* was identified by standard microbiological methods and according to the criteria of the National Committee for Clinical Laboratory Standards, with the recommended media and standard control strains.⁹⁻¹¹

Sensitivity to various antibiotics were performed for *E. coli* by standard Kirby-Bauer disc diffusion method.¹² After inoculation with organisms and placement of discs, Mueller-Hinton agar plates were incubated at 37°C for 18-24 h and the zone of inhibition (ZOI) was measured. The following standard antibiotic discs (mcg) were used: ampicillin (10), cefixime (30), gentamicin (10), netilmicin (30), co-trimoxazole (25), ciprofloxacin (5), norfloxacin (10), levofloxacin (5), doxycycline (30), nitrofurantoin (300), and imipenem (10). Screening test for ESBL production was performed using cefotaxime (CTX) and ceftazidime (CAZ) tested in combination with clavulanic acid (CLA). A diameter of inhibition zone of CAZ <22 mm or CTX <27 mm were used as screening test to indicate ESBL production. Phenotypic confirmatory double-disc test was performed using CTX, CAZ, and CAZ/CLA (CAC) discs. A CAZ 30 μ g disc was tested alone and also along with a combination of 10 μ g of CLA. An increase in the zone diameter of ≥ 5 mm for the CAC was considered to be due to an ESBL producer.

For confirmation, minimum inhibitory concentration (MIC) was detected by using Triple ESBL detection Ezy MIC TM Strip (MIX+/MIX [CAZ, CTX, and cefepime Mix: 0.125-16; CAZ, CTX, and cefepime Mix + CLA: 0.032-4]). This phenotypic ESBL detection strip is coated with a mixture of the three different antibiotics with and without CLA on a single strip in a concentration gradient manner. The upper half has CAZ, CTX, and cefepime (mixture) + CLA with the highest concentration tapering downward, whereas lower half is similarly coated in a concentration gradient in the reverse direction. All culture media and antibiotic discs were procured from HiMedia

Laboratories, Mumbai, India. All results were interpreted according to Clinical and Laboratory Standards Institute (CLSI) guidelines.⁹ Quality control was performed by CLSI recommended *E. coli* ATCC 25922 and *E. coli* 35218 strains.

Statistical Analysis

Statistical software SPSS11 was used for analysis of data. All means (age and ZOI) have been expressed as ± standard deviation (SD). Student *t test* was used to compare continuous variables and values are given as 95% confidence interval (CI) derived from the standard error of the mean. Chi-square test was used to compare categorical (gender, percent of resistance) variables. A *P* < 0.05 was considered as significant.

RESULTS

A total of 385 children with culture-proven *E. coli* CAUTI were included in the study. Among this 239 (62.1%) were boys and 146 (37.9%) girls with a mean age of 31.44 ± 1.56 months. Of the 385 *E. coli* isolates, 159 (41.3%) were ESBL positive. Among ESBL positive isolates, 107(67.2%) were from boys and 52 (32.7%) were girls. The mean ages of ESBL and non-ESBL producers were 30.83 months and 31.87 months, respectively with no statistical significance (*P* = 0.71). Gender was also not statistically significant (chi-square 3.13; *P* = 0.08). Figure 1 shows the percentage of resistance of CA *E. coli* to various antimicrobials. Resistance to multiple classes of antibiotics was noted among isolates including ampicillin (69.9%), CTX (92.2%), CAZ (85.7%), cefixime (84.4%), co-trimoxazole (56.9%), doxycycline (35.8%), gentamicin (31.7%), netilmicin (10.1%) ciprofloxacin (60.5%), levofloxacin (38.4%), norfloxacin (55.6%), and nitrofurantoin (15.6%). One strain of ESBL *E. coli* was resistant to imipenem (0.3%). Table 1 shows the ZOI for

different antibiotics with reference to ESBL production. The ZOI of ESBL positive *E. coli* was less for ampicillin, cefixime, CTX, CAZ, ciprofloxacin, co-trimoxazole, and nitrofurantoin when compared to ESBL negative *E. coli*. The ZOI for ceftazidime-clavulanic acid was significantly more in case of ESBL positive *E. coli*. The *P* value was significant for ampicillin (0.002), cefixime (0.002), CAZ (0.000), and CAC (0.000).

Table 2 allows the comparison of antibiotic resistance patterns of ESBL positive and negative CA *E. coli*. The association between ESBL production and drug resistance was significant for cefixime (*P* = 0.000), CTX (*P* = 0.037), CAZ (*P* = 0.000), and CAC (*P* = 0.000) when compared to non-ESBL *E. coli*. ESBL positive *E. coli* showed more than 90% of resistance to the cephalosporin group of antibiotics and 57% against ciprofloxacin and norfloxacin. However, resistance against doxycycline, gentamicin, and levofloxacin was less than 35%. Least resistance was observed for imipenem, netilmicin, and nitrofurantoin. Non-ESBL

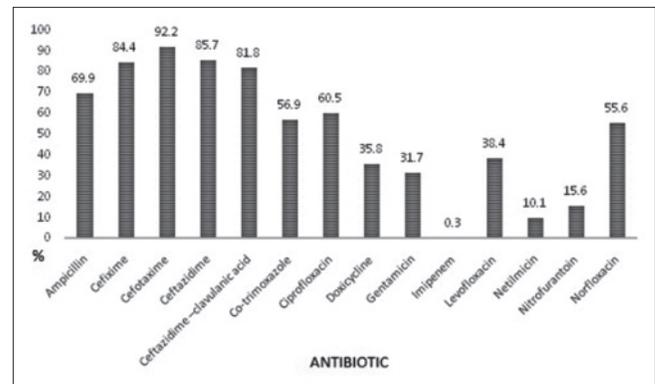


Figure 1: Antimicrobial resistance in percentage of *Escherichia coli* isolates in community-acquired pediatric urinary tract infection

Table 1: Zone of Inhibition in millimeters for various antibiotics with reference to ESBL production in *E. coli* isolates in community-acquired pediatric urinary tract infection

Antibiotic	Zone of inhibition (mm) mean±standard deviation		<i>P</i>	95% CI	
	ESBL positive (n=159)	ESBL negative (n=226)		Upper	Lower
Ampicillin	11.90±6.77	13.89±5.18	0.002	-3.25	-0.74
Cefixime	6.11±6.086	8.38±8.26	0.002	-3.70	0.82
Cefotaxime	12.95±7.03	14.46±7.28	0.601	-2.97	-0.44
Ceftazidime	8.10±5.89	13.19±7.34	0.000	-6.42	-3.7
Ceftazidime-clavulanic acid	21.96±4.98	16.12±7.17	0.000	4.62	7.05
Ciprofloxacin	15.57±8.85	15.81±8.46	0.533	-2.0	1.50
Cotrimoxazole	11.71±9.27	12.63±10.01	0.101	-2.89	1.05
Doxycycline	15.00±5.48	15.21±5.011	0.555	-1.27	0.85
Gentamicin	15.42±4.22	15.30±3.93	0.118	-0.70	0.95
Imipenem	27.85±2.68	27.92±3.122	0.053	-0.07	1.13
Levofloxacin	18.97±5.23	18.42±6.12	0.337	-0.58	1.70
Netilmicin	17.31±3.80	16.69±3.45	0.459	-0.12	1.34
Nitrofurantoin	17.88±4.29	18.49±2.77	0.119	-1.37	0.16
Norfloxacin	13.03±9.10	13.79±9.71	0.171	-2.69	1.16

ESBL: Extended-spectrum beta-lactamase, CI: Confidence interval, *E. coli*: *Escherichia coli*

Table 2: Comparison of antibiotic resistance patterns of ESBL positive and negative *E. coli* isolates in community-acquired pediatric urinary tract infection

Antibiotic	Percentage of resistance		Chi-square	P
	ESBL positive (n=159)	ESBL negative (n=226)		
Ampicillin	74.80	66.30	3.18	0.074
Cefixime	93.00	78.30	15.46	0.000
Cefotaxime	95.50	89.80	4.33	0.037
Ceftazidime	98.10	76.90	34.02	0.000
Ceftazidime-clavulanic acid	69.00	90.70	29.07	0.000
Ciprofloxacin	57.20	62.80	1.22	0.268
Co-trimoxazole	59.10	55.30	0.55	0.457
Doxycycline	35.20	36.20	0.05	0.830
Gentamicin	34.50	29.60	1.05	0.300
Imipenem	0.60	-	0.75	0.401
Levofloxacin	31.40	43.30	5.60	0.018
Netilmicin	8.10	11.50	1.13	0.287
Nitrofurantoin	16.30	15.01	0.12	0.728
Norfloxacin	57.80	53.90	0.57	0.451

ESBL: Extended-Spectrum Beta-Lactamase, *E. coli*: *Escherichia coli*

producers showed a higher percentage of resistance to ciprofloxacin ($P = 0.268$) and levofloxacin ($P = 0.018$).

DISCUSSION

In this study provides data on the prevalence of ESBL *E. coli* and their antibiotic resistance pattern in community-acquired pediatric UTI from Kerala, India. Till date, only a few studies have described the epidemiology of community-acquired pediatric UTI caused by ESBL-producing bacteria.^{2,4,13} The sample size of the present study exceeds the reports of several other authors. The present study ($n = 385$) has shown that 41.3% of pediatric CA *E. coli* isolates were ESBL producers. Kizilca *et al.* ($n = 344$) from Turkey and Aggarwal *et al.* ($n = 100$) from India have reported prevalence of 41.4% and 40% of ESBL positive *E. coli* in community-acquired UTI in children comparative to our study.^{14,15} A lower prevalence has been reported by Sood and Gupta ($n=213$) and Tankhiwale *et al.* ($n = 217$) of 23.83% and 18.5%.^{16,17} There were no statistical differences between the ESBL-producing and non-ESBL-producing *E. coli* with regard to gender and age. There were no statistical differences between the ESBL-producing and non-ESBL-producing *E. coli* with regard to gender and age.

In our study, CA ESBL *E. coli* showed high resistance rate to most of the currently used antimicrobial agents such as ampicillin (74.8%), cephalosporins including third generation (>90%), quinolones specifically ciprofloxacin, and norfloxacin (about 57%), co-trimoxazole (59.1%)

but comparatively less resistance rate to gentamicin (34.5%), levofloxacin (31.4%), nitrofurantoin (16.3%), netilmicin (8.1%), and imipenem (0.6%). The data are similar to a study from a tertiary care teaching hospital in Switzerland, in which CA ESBL-producing *E. coli* urinary isolates showed high resistance rates to most of the currently used oral antimicrobial agents, amoxicillin-clavulanate (69.6%), ciprofloxacin and norfloxacin (84.8% and 83.9%, respectively), co-trimoxazole (75.9%), and least for nitrofurantoin (15%).¹⁸ Kizilca *et al.* from Turkey demonstrated a resistance rate of 83.1% for co-trimoxazole, 47.3% for quinolones, 39.9% for aminoglycosides, and 18.2% for nitrofurantoin.¹⁴ Our study showed higher resistance to ciprofloxacin (57.2%) when compared to 39% and 31.5% resistance reported by Calbo *et al.* and Colodner *et al.* who respectively in ESBL-producing *E. coli* isolates.^{19,20} Azap *et al.* report extremely high rate of ciprofloxacin resistance (84%).²¹ One strain of ESBL *E. coli* showed imipenem resistance which limits the treatment option using the reserve drug.

It is concerning that non-ESBL-producing *E. coli* isolates had high rates of resistance to antibiotics. In our study, the resistance rate shown by non-ESBL *E. coli* is much higher compared to Kizilca *et al.* data in which non-ESBL-producing isolates showed resistance rate of 4.6% for nitrofurantoin, 9.7% for fluoroquinolones, and 9.7% for aminoglycosides.¹⁴

Our study has limitations. First, there was no correlation with clinical data including the presence of recurrent UTI in these children and evaluation for underlying renal anomalies which could explain the resistance due to polymicrobial therapy. Second, molecular characterization to detect the presence of genes responsible for ESBL production was not done which may be an additional limitation of the study. Finally, our study was done in a specific geographic area in the State of Kerala alone.

CONCLUSION

The study provides a regional data on the epidemiology and antibiotic resistance patterns of ESBL and non-ESBL-producing *E. coli* among pediatric patients with community-acquired pediatric UTI. There is high resistance to commonly used antibiotics in community-acquired pediatric UTI in both groups. Urine culture should be done in children with febrile illness, and there is a need for continued monitoring of antimicrobial susceptibility of *E. coli* isolates in community-acquired pediatric UTI. ESBL confirmatory tests should be part of routine antibiotic susceptibility testing, and ongoing local epidemiological surveillance and knowledge are critical to monitor

variability in resistance patterns and management. Empiric treatment of childhood UTI with primary antibiotics including ampicillin, cephalosporins, quinolones, and cotrimoxazole may no longer be adequate, and there may be a for revising antibiotic prescription policy and aggressive implementation of antimicrobial stewardship programs.

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A Simplified Approach to Dacryocystorhinostomy: A Prospective Study

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Abstract

Introduction: Chronic dacryocystitis usually occurs due to the obstruction of lacrimal passage at the junction of the lacrimal sac and nasolacrimal duct. The reconstruction of lacrimal passages in such cases can be achieved by several surgical techniques. We present an easy and stress-free technique of doing dacryocystorhinostomy (DCR) by suturing of anterior flaps and excision of the posterior flaps of the lacrimal sac and nasal mucosa.

Objective: To present the outcome of the modified technique of external DCR with anterior flap anastomosis with the excision of posterior flaps and intubation.

Materials and Methods: The present prospective study was conducted in the Post-graduate Department of Ophthalmology, Sher-i-Kashmir Institute of Medical Sciences and Hospital, Bemina. The study included 62 patients with nasolacrimal duct obstruction who underwent the modified technique of external DCR with anastomosis of anterior flaps only, whereas the posterior flaps were excised. The success rate and complications were recorded over a follow-up period of 6 months.

Results: The mean age of our study group was 37.8 + 8.7 years. There was a female preponderance with a male:female ratio of 1:2.6. The success rate of this modified technique was found to be 93.5%. Intraoperative complications were bleeding in 12.9% and laceration of the nasal mucosa in 4.8% cases. Four patients had failed DCR after 12 months. In 3 cases, the obstruction of the bony ostium by granulation tissue and in one case, the sump syndrome was the cause of failure of DCR.

Conclusion: This modified technique of external DCR only simplifies the surgical procedure without compromising on efficacy or safety of the procedure. Anterior flap DCR is a safe, easy to master and effective surgical procedure.

Key words: Chronic dacryocystitis, Dacryocystorhinostomy, Nasolacrimal duct obstruction

INTRODUCTION

External dacryocystorhinostomy (DCR) remains the gold standard procedure for the treatment of nasolacrimal duct obstructions (NLDO). The principle of DCR is the removal of bone lying between the lacrimal sac and

the nasal mucosa, and making an anastomosis between the medial wall of the sac and nasal mucosa.

In 1904 Toti¹ a French Ophthalmologists first described the technique of external DCR. In his classical method, lacrimal sac was exposed through an external skin incision, a lacrimal fossa rhinostomy was performed, the nasal mucosa and the medial portion of the lacrimal flap excised, and the wound closed with skin sutures. The more advanced methods that appeared to be very successful were described by Dupuy-Dutemps and Bourguet² in 1921. In this procedure, both anterior and posterior flaps were formed and then anastomosed with nasal mucosa. Older³ introduced the use of silicon tube in external DCR. Numerous modifications

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have been described for dacryocystorhinostomy, but the basic procedure has withstood the test of time and has a high success rate of 93-95%.⁴ Watering of the eye due to obstruction of the nasolacrimal duct is called epiphora. It is a common problem about 33% of the complaints in routine ophthalmological practice.⁵ Tears are secreted by the lacrimal gland with secretory volume of approximately 10 ml/day.⁶ Tears pass from the lacrimal lake into the canaliculi through the upper and lower lacrimal puncta. When the eyelids are closed the two puncta come in contact with each other and become physiologically occluded when the lids open capillary action draw the tears into the empty canaliculi. Tears then flow into the common canaliculi and lacrimal sac. Tears are then directed into the inferior meatus of the nose through the effect of lacrimal pump mechanism in which orbicularis oculi muscle plays an important role and to a fewer extent by the pressure changes within the nose created by normal respiratory movements of the air. Valves within the lacrimal pathway allow only the unidirectional flow of tears, i.e., toward the inferior meatus of the nose through the valve of hasner. The most common site of obstruction is at the level of the lacrimal sac and nasolacrimal duct. The obstruction causes stasis of the sac contents. This vicious cycle of stasis and infection causes dacryocystitis. Persistent tearing, mucopurulent discharge expressed through the puncta while pressing on the lacrimal area, chronic conjunctivitis, and swelling of the lacrimal sac in the medial canthal area are the symptoms of nasolacrimal duct obstruction leading to acute or chronic dacryocystitis.^{6,7}

Nasolacrimal duct obstruction is more common in females than males. Zaman *et al.*^{1,7} states that the narrow nasolacrimal duct in females predisposes them to the obstruction by sloughed off debris due to the hormonal changes that bring about a generalized de-epithelization.

The failure of external DCR has been attributed to many factors. The important factors responsible for failure are granulation tissues from the nasal mucosa closing the rhinostomy, small size of the ostium, inadequate size, and fashioning of anastomotic flaps leading to kinking of the canaliculi, sagging of the anterior flaps, partial thickness lacrimal sac flaps, and postoperative soft tissue infection.^{8,9}

The success of DCR depends on the adequate anatomical exposure of the deeply seated lacrimal sac to obtain a good anastomosis of the flaps and a proper sized ostium. Due to a difficult anatomical terrain, a constrained surgical field and presence of intraoperative bleeding, handling of flaps particularly posterior flaps becomes very difficult and strenuous for the surgeon. This difficulty level is enhanced for those who are starting to learn the procedure.

Keeping in mind, the above mentioned factors in our study, we tried a simple and easy form of external DCR with suturing of anterior flaps only with the excision of the posterior flaps along with silicon tube intubation of the fistula for 6 months.

MATERIALS AND METHODS

The present prospective study was carried out in the Post-graduate Department of Ophthalmology, Sher-i-Kashmir Institute of Medical Sciences and Hospital Bemina, which is a tertiary care center. The present study was carried out between January 2014 and May 2015. The study was approved by Institutional Ethical Committee. Sixty adult patients >20 years of age with the primary NLDO with or without mucocele were included in this study. The exclusion criteria included the patients who had canalicular and punctal occlusion, the lower eyelid deformity, nasal mucosal pathology, bleeding diathesis, and trauma with facial fractures. The complete history was taken in every case and a thorough clinical examination was done which included the anterior segment examination under slit lamp biomicroscope of each eye, the examination of the lacrimal drainage system (puncta, swelling, tenderness, and regurgitation on pressure). Preoperatively, the lacrimal sac syringing was done in all cases. A thorough rhinological checkup was done in all cases to exclude the grossly deviated nasal septum, nasal polyps, hypertrophied turbinate and atrophic rhinitis. All routine investigations including hemogram, bleeding time, and clotting time were done. The local antibiotics were started week before surgery. Nasal decongestants were started 24 h prior to the surgery. The written and informed consent were obtained from all the patients.

Surgical Technique

In this modified procedure of external DCR, anastomosis of anterior flaps only was created by suturing anterior flaps of the lacrimal sac and the nasal mucosa, whereas posterior flaps were excised.

Premedication containing pentazocin 1 ml and promethazine 1 ml were given intramuscularly one hour prior to the surgery. All surgeries should be performed under local anesthesia using xylocaine 2% and adrenaline 1 in 1,00,000. A curvilinear or the straight skin incision of 8-10 mm length, corresponding to the anterior lacrimal crest was given, care being taken to avoid the angular vein (Figure 1). After that the orbicularis muscle is bluntly dissected until the medial canthal tendon and periosteum are exposed. The anterior limb of the medial canthal tendon is incised exposing the lacrimal sac. The periosteum is incised and reflected backward. The anterior



Figure 1: Skin incision



Figure 3: Anastomosis of anterior lacrimal and nasal mucosal flaps



Figure 2: (a and b) Ostium formation



Figure 4: Closure of the incision

lacrimal crest and the lacrimal fossa are exposed using a periosteum elevator, the suture between the lacrimal bone and the frontal process of ethmoid bone is separated. The opening is then enlarged using a bone punch to make a rhinostomy of about 15 mm in diameter (Figure 2a and b). The bony window includes the entire anterior lacrimal crest, lacrimal fossa, and the superomedial wall of the nasolacrimal canal. The utmost care is taken to keep the nasal mucous membrane intact. It is necessary to remove the anterior lacrimal crest down to the level of the nasolacrimal duct. The landmarks of bony ostium were anteriorly up to 5 mm anterior to the anterior lacrimal crest, posteriorly up to posterior lacrimal crest, superiorly up to the level of medial palpebral ligament, and inferiorly up to the beginning of nasolacrimal duct. The margins of osteotomy were made smooth.

The next step was to fashion the mucosal flaps. A “U” shaped incision was made in the medial wall of lacrimal sac after tenting it with a Bowman’s probe. By this way, we got a larger anterior flap and a small posterior flap. Similarly, the “U” shaped incision was made in the exposed

nasal mucosa after putting in a nasal pack. Remnants of the posterior mucosal flaps were excised. The silicon tube intubation was done through the fistula created. The anterior mucosal flaps were then sutured using two to three 6-0 vicryl sutures passing through the middle, superior, and inferior edges of the flaps (Figure 3). Upon the completion of mucosal anastomosis, periosteum, and orbicularis muscles were sutured with 6-0 vicryl. The skin was then closed with 6-0 black silk suture (Figure 4). The light bandage was put on the wound and the nasal pack was removed. The skin sutures were removed on the 7th day post-operatively and the silicon tube was removed at 6 months post-operatively.

Follow-up examinations were done on 1st post-operative day, 7th post-operative day, 1 month, 3 months, 6 months, 9th month, and 12th month. Probing and syringing were attempted if epiphora occurred post-operatively. Absence of epiphora at the end of 1 year follow-up without the need for further surgical intervention was considered a success.

RESULTS

The mean age of our study group was 37.8 ± 8.7 years. 45 (72.6%) patients were females and 17 (27.4%) were males. There was a female preponderance noted in our study with a male:female ratio of 1:2.6. 88.7% of the patients were between the ages of 20-50 years (Table 1).

Intraoperative and post-operative complications are shown in Tables 2 and 3, respectively.

The source of bleeding was nasal mucosa in six cases and in two cases, the angular vein was ruptured.

There was no case of orbital hemorrhage, orbital emphysema, and cerebrospinal fluid (leakage) in our study. The success rate of this technique was 93.5%. Of the 4 patients with failed DCR, three had granulation tissue blocking the rhinostomy site, whereas in one patient sump syndrome developed (Table 4).

DISCUSSION

The management of obstructive lesions occurring in the lacrimal drainage apparatus has a long history. The

external DCR is a highly successful procedure in managing an epiphora due to NLD obstruction. The reported success rate varies between 85% and 100%.¹⁰⁻¹² In recent years, endonasal DCR and endolaser DCR has been gaining in popularity over the traditional DCR owing to the advantages of no scar, less tissue damage, and less intraoperative time.^{13,14} However, these procedures have their own limitations, endonasal laser DCR has a long-term success rate of 79%,¹⁴ this procedure is difficult to perform in the presence of altered bony anatomy in the region or after trauma.¹⁴

The external DCR is a highly successful procedure,¹⁰⁻¹² however, the surgical procedure is not technically easy and requires considerable experience as well as operative time. Due to the inaccessibility through a difficult anatomical terrain and a constrained surgical field the handling of posterior flaps in a double flap surgery becomes very difficult. To add the level of difficulty intraoperative hemorrhage makes suturing of the posterior flaps a very strenuous job. For beginners who are starting to learn DCR meticulous handling of posterior flaps is again a strenuous job. Keeping in mind the above-mentioned factors, we hereby present a simplified way of doing DCR with anastomosis of anterior flaps along with excision of posterior flaps. This technique is a common variation of the traditional external DCR.

The age and gender distribution of our patients generally complies with figure in literatures.^{11,15,16} The mean age of our study group was 37.8 ± 8.7 years. Of the 62 patients 45 (72.6%) were females and 17 (27.4%) were males. The male to female ratio was found to be 1:2.6. This female preponderance can be explained by a narrow lower nasolacrimal duct and the secondary hormonal changes in the middle aged females.¹⁷ Zaman *et al.*¹⁷ in his study stated that the narrow lacrimal fossa in females predisposes them to the obstruction by sloughed off debris, due to the hormonal changes that bring about a generalized de-epithelization.

In our study, only 4 patients out of 62 patients had epiphora and discharge 6 months post-operatively, all other patients were symptom-free. This reflected a success rate of 93.5% which compares favorably with other studies using different flap technique designs.^{10,11,12,15,16} A study by Elwan *et al.*¹¹ reported a success rate of 90% with excision of posterior flap and 85% with suturing, he concluded that excision of the posterior flaps of lacrimal sac may improve the success rate. A study by Zaman *et al.*¹⁷ reported a success rate of 98.33% by suturing only the anterior flap and engaging them in the muscle layer. Baldeshi *et al.*¹⁰ anastomosed anterior flap and did not suture the posterior flap and reported a success rate of 100%. Serine *et al.*¹⁸ reported that with posterior flap anastomosis success rate was 93.75%

Table 1: Demographic profile of the study group

Age group in years	Male	Female	Total (%)
20-30	3	8	11 (17.7)
31-40	8	17	25 (40.3)
41-50	4	15	19 (30.6)
51-60	2	5	7 (11.3)
Total	17 (27.4%)	45 (72.6%)	62 (100)

Table 2: Intraoperative complications

Complications	Number of patients	Percentage
Bleeding	8	12.9
Laceration of nasal mucous	3	4.8

Table 3: Post-operative complications

Complications	Number of patients	Percentage
Epistaxis	5	8.06
Wound sepsis	2	3.2
Sinusitis	4	6.5
Loss of tube	2	3.2
Epiphora with mucopurulent discharge	4	6.5

Table 4: Cause of failure of DCR

Cause of failure	Number of patients
Ostium closure due to granulation tissue	3
Sump syndrome	1

DCR: Dacryocystorhinostomy

and with resection it was 96.67%. He suggested that DCR with double flap anastomosis has no advantage over DCR with only anterior flaps.

In our study, the silicon tube intubation was done in every patient. Hussein *et al.*¹⁹ did a comparative study and found a success rate of 94.7% in intubated cases against a success rate of 77.8% in non-intubated cases similarly Advani *et al.*²⁰ also found a success rate of 95% in intubated cases and 88% in non-intubated cases. From this, we can conclude that the silicon tube intubation is a useful adjunctive procedure in DCR which increases the chances of success. This may have been one of the reasons for a high success rate of 93.5% obtained in our study.

Intraoperative complications encountered were bleeding in 8 patients (12.9%). The source of bleeding was nasal mucosa in 6 cases and in 2 cases angular, the vein was ruptured. The bleeding was controlled by nasal packing and ligating the angular vein, and the surgery was successfully completed. Proper nasal packing is a must as it is critical to reduce the intraoperative bleeding which makes the surgeon comfortable.

Post-operatively, we encountered the epistaxis in 5 patients (8.06%) which required nasal packing. Two patients (3.2%) came back with loss of tube; wound sepsis was seen in two patients who were treated with antiseptic dressing along with betadine and systemic antibiotics. Sinusitis which developed post-operatively was seen in four patients (6.5%) epiphora with mucopurulent discharge (failed DCR) occurred in 4 patients (6.5%). The cause of failure was granulation tissue blocking the rhinostomy site in 3 cases and one patient developed sump syndrome. These complication rates are similar to other studies.²¹ Our modified anterior flap anastomosis technique did not cause any significant complications as compared to other studies while maintaining the well-known reliability of the procedure.

CONCLUSION

The future of lacrimal surgery is changing with the introduction of endoscopes and lasers, but the external DCR still remains the gold standard for lacrimal surgery. This modified technique of external DCR only simplifies

the surgical procedure without affecting its reliability or complication rates. It is particularly helpful for beginners who are starting to do lacrimal surgery. This study adds to the usefulness of modified anterior flap DCR technique. This study concludes that suturing of anterior flaps with excision of posterior flaps along with the silicone tube intubation is a successful procedure.

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Pattern of Ocular Diseases in Children Attending Outpatient Department of A Rural Medical College in Central India

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Abstract

Background: Ocular diseases in children vary from region to region. Childhood ocular morbidity can lead to lifelong blindness or visual impairment. Our study will help in understanding ocular diseases affecting children living in rural areas in a better way.

Materials and Methods: The present cross-sectional study was conducted in the Eye Department of R D Gardi Medical College, Ujjain, India. 1100 children aged ≤16 years were enrolled in the study. The children were divided into three groups: 0-5 years, 6-12 years, and 13-16 years, for studying various ocular morbidities in different age groups. Each child was subjected to a comprehensive ophthalmic evaluation, and the results were recorded and analyzed in detail.

Results: Refractive error was most common ocular problem detected in 461 (41.90%) children. 18 (1.63%) children were found to be suffering from amblyopia. Conjunctivitis was seen in 155 (14.09%) children. Congenital cataract, spring catarrh, vitamin A deficiency, trachoma, and dacryocystitis were other common diseases found in children in our study.

Conclusion: Ocular diseases in children vary from place to place. Climatic conditions, malnutrition, and lack of treatment facilities play an important role in the pattern of occurrence of ocular diseases.

Key words: Congenital cataract, Conjunctivitis, Refractive error, Vitamin A deficiency

INTRODUCTION

Ocular diseases affect every individual in this world, with the only difference being in the pattern of occurrence of disease depending on age, sex, region, and climatic conditions. Children are susceptible to many ocular diseases, especially those who are malnourished and living in unhygienic conditions. The pattern of ocular diseases varies, depending on whether they are living in developed countries or developing countries. Certain ocular diseases in children can lead to blindness or visual impairment, which can directly affect their growth and development.

Poor socio-economic condition and lack of proper medical facilities in rural areas are other important causes contributing to childhood blindness. Our study will help in understanding ocular diseases affecting children in a better way.

There are an estimated 19 million children worldwide with visual impairment, of which 1.26 million are bilaterally blind.¹ Approximately 500,000 children become blind every year and 60% of these die within 1-2 years of becoming blind.²

It is estimated that 1.5 million children suffer from severe visual impairment and of these, one million children live in Asia.³ Childhood blindness is second only to cataract in terms of blind years.⁴ Eye diseases are an important cause of medical consultation.⁵ The pattern of ocular diseases in children varies depending on the anatomical structure involved, such as whole globe or specific tissues of the eye such as sclera, cornea, uvea, conjunctiva, lens, and retina. Childhood

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ophthalmic disorders can seriously impact development, education, future employment, and quality of life. A major proportion of childhood blindness has been found to be preventable.⁶ Vitamin A deficiency is an important cause of visual impairment and night blindness, predominantly seen in children who are malnourished, especially in the rural areas of developing countries. It is estimated that worldwide, every year 5-10 million children develop xerophthalmia, of which a significant proportion go blind.⁷

In the United States, strabismus, amblyopia, and optical problems affecting visual acuity are the most common ocular problems seen among school - aged children.⁸ Eye injuries remain a major cause of unilateral visual impairment worldwide.⁹ School-going children have a high incidence of ocular trauma, which may be trivial injuries or potentially vision threatening injuries. These injuries can be open-globe injuries or closed-globe injuries. The blindness resulting from ocular injuries in children in the rural areas is usually due to the lack of medical facilities and improper treatment taken in the early phase of injury.

Refractive errors, strabismus, and amblyopia are diseases which are commonly found in children and should be managed as soon as they are detected. School health services that regularly screen for refractive error and refer affected children for refractive services can prevent poor performance in school and the development of amblyopia.¹⁰

School-going children also show a very high prevalence of allergic conjunctivitis. Vernal keratoconjunctivitis is common in male children, who usually have a complaint of severe itching and foreign body sensation in eyes. Corneal ulcers, trachoma, and dacryocystitis are also seen in children who are malnourished and living in unhygienic conditions.

Congenital cataracts are often seen in children whose mothers were exposed to infections and malnourishment during pregnancy. Children should receive prompt and proper eye care to avoid vision problems and eye morbidities.¹¹

The majority of ocular diseases found in children can be easily managed by improving the screening facilities in the rural areas as it will help in providing early and proper care to the affected children.

MATERIALS AND METHODS

The present study was conducted at R. D. Gardi Medical College, village Surasa; district Ujjain, which predominantly caters to the rural population of Malwa region of Madhya Pradesh. The study period was 6 months, from July

2014 - December 2014. All children ≤ 16 years of age, reporting to the Eye outpatient department (OPD) for the first time were included in the study. A total of 1100 children were enrolled in the study after taking written informed consent from the guardians. The study protocol was approved by the Local and Institutional Ethics Committee. The children were divided into three groups: Preschool (0-5 years), school-going (6-12 years), and older (13-16 years) children for studying various ocular morbidities in different pediatric age groups.

After taking consent, the preliminary data such as name, age, sex, residence, educational status, and residential area were recorded first. Visual acuity testing and refraction was done for all children. Presence of amblyopia was noted. Detailed anterior segment examination was done by both torch - light and slit - lamp, specially keeping in mind the effects of ocular trauma, vitamin A deficiency, corneal ulcers, strabismus, and trachoma. Dilated pupil examination was done to see for abnormalities of lens, vitreous, and retina. The presence of congenital cataracts or any posterior segment disorders was noted. Intraocular pressure was recorded. Ocular USG and laboratory investigations were done wherever required. Only the one main ocular condition or diagnosis, which had led to the current OPD visit, was taken into consideration for each patient. The whole data were then analyzed in detail.

RESULTS

Our study was conducted in Eye OPD, R D Gardi medical College, a rural medical college in Ujjain district of central India. A total of 1100 children were included in the study. 603 (54.82%) were male and 497 (45.18%) were female children in the study group (Table 1). This showed slight preponderance of various ocular diseases in male as compared to female children. There were 124 (11.27%) children ≤ 5 years of age and 976 children ≥ 6 years of age in the study group (Table 2). Refractive error was the most common ocular problem detected in 426 (38.72%) children ($P < 0.0001$). 230 of these children (53.99%) were in the age group of 13-16 years (Table 3 and Figure 1). 18 (1.63%) children were found to be suffering from amblyopia (Table 4 and Figure 2). Strabismus was found in 35 (3.18%) children. Adeoya *et al.*¹² had found the incidence of strabismus as 2.4% in their study group. Dacryocystitis was found in 51 (4.63%) children.

Congenital cataract was found in 24 (2.18%) children, and of these 14 (58.33%) were male and 10 (41.66%) were female children (Table 5), which is suggestive of the preponderance of congenital cataract in the male child. Mothers of the children who had congenital cataract

Table 1: Sex distribution in the study group (n=1100)

Sex	Number	Percentage
Male	603	54.82
Female	497	45.18
Total	1100	100

Table 2: Age distribution in the study group (n=1100)

Age of children	Number	Percentage
0-5 years	124	11.27
6-12 years	468	42.55
13-16 years	508	46.18
Total	1100	100

Table 3: Age-sex distribution of refractive error in study group (n=426)

Age of child	Male	Female	Total (%)
0-5 years	18	11	29 (6.80)
6-12 years	102	65	167 (39.20)
13-16 years	112	118	230 (54.01)
Total	232	194	426 (100)

Table 4: Pattern of ocular diseases in study group (n=1100)

Ocular diseases	Number of cases	Percentage
Refractive error	426	38.72
Amblyopia	18	1.63
Squint	35	3.18
Congenital cataract	24	2.18
Dacryocystitis	51	4.63
Infective conjunctivitis	155	14.09
Eye injuries	93	8.45
Stye/Chalazion	119	10.81
Corneal ulcer	12	1.09
Trachoma	48	4.36
Spring catarrh	39	3.54
Vitamin A deficiency	48	4.36
Iridocyclitis	09	0.81
Chorioretinitis	06	0.54
Congenital glaucoma	05	0.45
Orbital cellulitis	07	0.63
Retinoblastoma	02	0.18
Optic atrophy	03	0.27

had a history of malnourishment or infection during pregnancy. Ocular injuries were seen in 93 (8.45%) children ($P < 0.0001$).

Spring catarrh was found in 39 children (3.54%). 22 (56.41%) out of the 39 children were in age group of 6-12 years (Table 6). Trachoma was seen in 48 (4.36%) children. These diseases were common in rural areas due to the exposure of children to the dry, dusty, and unhygienic environment. Corneal ulcers were seen in 12 (1.09%) children in the study group.

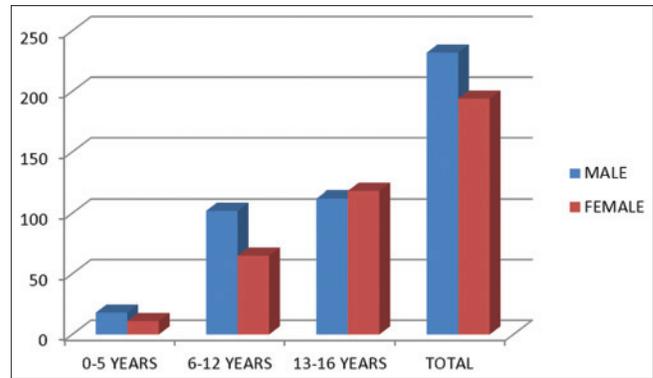


Figure 1: Age sex distribution of refractive error in study group (n=426)

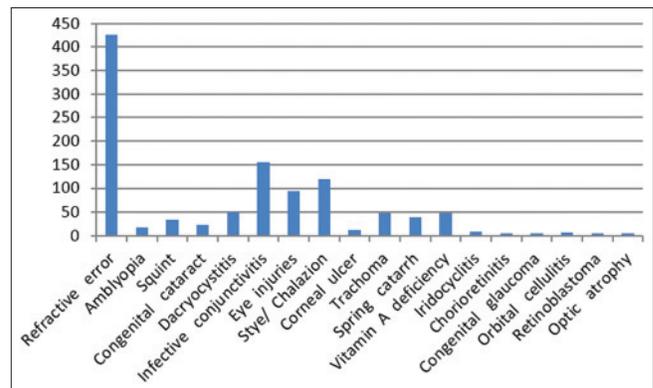


Figure 2: Pattern of ocular diseases in study group (n=1100)

Vitamin A deficiency was seen in 48 (4.36%) children, mostly <5 years of age, who were malnourished. 22 (45.83%) of the 48 children had conjunctival xerosis (Table 7). Lid inflammations such as the stye, chalazion, and blepharitis were seen in 119 (10.81%) children. Infective conjunctivitis was seen in 155 (14.09 %) children ($P < 0.0001$). Retinoblastoma was seen in 2 (0.18%) and congenital glaucoma was found in 5 (0.45%) children. Optic atrophy was found in 3 (0.27%) children.

Iridocyclitis was seen in 9 (0.81%) children and chorioretinitis was seen in 6 (0.54%) children in the study group.

Our study found that the most common ocular disease occurring in children ≤ 16 years of age, in our area, was uncorrected refractive error followed by conjunctival disorders mainly due to adverse climatic conditions and poor hygiene. Vitamin A deficiency was also common as many of the children were malnourished.

DISCUSSION

Uncorrected refractive error was the most common ocular morbidity in our study, as most of the children (88.72%) in our study group were ≥ 6 years of age, who could articulate their problems to parents/care givers.

Table 5: Sex distribution of congenital cataract in study group (n=24)

Sex of child	Number	Percentage
Male	14	58.33
Female	10	41.66
Total	24	100

Table 6: Age-wise distribution of spring catarrh in study group (n=39)

Age of child	Number	Percentage
0-5 years	03	7.69
6-12 years	22	56.41
13-16 years	14	35.89
Total	39	100

Table 7: Distribution of vitamin A deficiency in study group (n=48)

Condition	Number of children	Percentage
Night blindness	08	16.66
Conjunctival xerosis	22	45.83
Bitot's spots	13	27.08
Keratomalacia	05	10.41

Strabismus was found in 3.18% children in our study group which was similar to the study of Adeoya *et al.*¹² who found the incidence of strabismus to be 2.4%.

Conjunctivitis, both infective and allergic, was seen in 17.63% children of our study group. Chakraborty *et al.*¹³ had found the incidence of conjunctivitis to be 29.57% in their study. The difference is attributable to the larger sample size of their study group.

Trachoma was found in 4.36% children in our study group, a result which is comparable to the study of Mehari¹⁴ where the incidence of trachoma was found to be 7.6%.

We found the incidence of eye injuries to be 8.45% in our study. Demissie *et al.*¹ found an incidence of 15.5%. This difference could be due to the ignorance and apathy of the rural populace, preventing them from seeking prompt medical attention in the event of injury.

Malnutrition is largely responsible for the delayed and improper development of a child, and also leads to

vitamin A deficiency in the affected children. Consequences of vitamin A deficiency were seen in 48 children of our study group.

CONCLUSION

Ocular diseases in children vary from place to place. Climatic conditions, malnutrition, and lack of treatment facilities also play an important role in the pattern of occurrence of ocular diseases. Spring catarrh and vitamin A deficiency were prevalent in our study group. Diseases such as uncorrected refractive errors and congenital cataract were found to be the treatable causes of blindness in our study. Our study highlights the epidemiology of pediatric ocular morbidities in the rural populace, thereby emphasizing the fact that most of the ocular diseases in children are either treatable or avoidable.

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Occurrence of Adenomyosis in Hysterectomy Specimen and its Clinical Correlation in a Tertiary Care Hospital in Mandya, Karnataka, India

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Abstract

Background: Adenomyosis is a common pathologic finding significantly related to reproductive and menstrual characteristics of the patients. It is characterized by the presence of endometrial tissue with or without hypertrophy or hyperplasia of surrounding myometrium. The pre-operative diagnosis based on clinical findings is very poor. This study is aimed at evaluating the occurrence of adenomyosis in hysterectomy specimen and to correlate the symptoms of patients with adenomyosis with histological features.

Materials and Methods: Case records of the patients who have undergone a hysterectomy in our institute from January 2011 to December 2014 were reviewed and clinical data recorded. Morphological findings were recorded and the number of cases diagnosed to have adenomyosis and adenomyosis associated co-morbid conditions were recorded.

Results: The adenomyosis was present in 158 patients out of 952 patients underwent the hysterectomy during the study period. The co-morbid conditions were seen in 78 patients. Majority were in the age group of 31-50 years. Menorrhagia, dysmenorrhea, metrorrhagia, intermenstrual pelvic pain, post-menopausal bleeding, and dyspareunia were the common presenting symptoms.

Conclusions: The adenomyosis was found in 16.59% of hysterectomy specimen commonly in multiparous women of 31-50 years presenting with menorrhagia, dysmenorrhea, metrorrhagia, intermenstrual pelvic pain, post-menopausal bleeding, and dyspareunia. Hence, a pre-operative diagnosis of adenomyosis may be considered in patients presenting with these symptoms without any definitive evidence of uterine fibroid, utero-vaginal prolapse, or ovarian mass.

Key words: Adenomyosis, Dysmenorrhea, Hysterectomy, Multipara

INTRODUCTION

Our understanding of benign myometrial lesions like adenomyosis lags far behind in spite of increasing prevalence of adenomyosis.¹ The adenomyosis is a benign gynecological disorder characterized by invasion of endometrial glands and stroma located haphazardly and deeply within the uterine myometrium.² It may be associated with hyperplasia and/or hypertrophy of adjacent myometrium.¹

Frequency of adenomyosis increases with age, peaks at 40-50 years and levels - off after menopause. Increase in frequency is also associated with multiparity.³ Menstrual irregularities, smoking, dilatation, and curettage are said to increase the risk of adenomyosis.⁴

The pre-operative diagnosis of adenomyosis based on clinical findings is very poor. It is asymptomatic in up to 1/3 to 1/2 of the cases. The symptomatic patients present with progressively increasing the severity of menorrhagia, dysmenorrhea, metrorrhagia, intermenstrual pelvic pain, and rarely dyspareunia.^{1,3,5} Chronic symptoms such as menorrhagia and dysmenorrhea correlate with the depth of myometrial involvement and age.⁶

In the majority of the patients, diagnosis is based on histological examination of hysterectomy specimen.⁴ Radiological procedures and serum CA125 assay are

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of limited diagnostic utility.⁴ A high frequency of pathological lesions are associated with adenomyosis which include leiomyoma, endometriosis, endometrial hyperplasia, carcinoma, and ovarian cyst, suggesting the possibility of a common underlying disorder like hyperestrogenism.^{1,6}

Reported prevalence of adenomyosis in hysterectomy specimen has varied from 8% to 20% in various studies conducted in Greece, Italy, Germany, and the USA. The prevalence is reported to be as high as 57% in Pakistan.⁷ Some studies have reported a prevalence as high as 61.5%. Wide variation in the prevalence is partially due to the difference in histological criteria adopted for diagnosis and also may be due to the difference in frequency of co-morbidities in different population that necessitate hysterectomy.⁷

Termination of pregnancy might affect the pathogenesis of adenomyosis, and may influence the myometrial depth and the number of foci.⁸ The adenomyosis is more common among post-menopausal breast cancer patients who were on treatment with tamoxifen.⁹

The purpose of this study is to characterize the prevalence of adenomyosis in hysterectomy specimen and correlate the symptoms of uterine adenomyosis with histological features and associated co-morbidities.^{10,11}

MATERIALS AND METHODS

The present study is a retrospective study conducted in the Department of Pathology, Mandya Institute of Medical Sciences (MIMS), Mandya for a period of 4 years from January 2011 to December 2014. Prior clearance was taken from the Institutional Scientific Committee and Institutional Ethical Committee. The study sample consisted of women who had undergone the hysterectomy and diagnosed to have adenomyosis and adenomyosis associated co-morbid conditions of uterus and ovary on histopathological examination. All pre-menopausal and post-menopausal women who underwent hysterectomy were included in the study. Case records of the patients were reviewed and clinical data such as age, gravida, parity, menstrual history, history of previous surgery, obstetric history, intermenstrual bleeding, dysmenorrhea, dyspareunia, and intermenstrual pelvic pain were noted. Where ever available, information regarding previous dilatation and curettage for gynecological indications was noted. The pre-operative indication of hysterectomy for adenomyosis and associated co-morbid conditions were recorded.

RESULTS

A total of 952 patients underwent the hysterectomy at MIMS, Mandya during the study period. The criteria adopted for diagnosis of adenomyosis include the presence of endometrial glands and stroma at a distance of more than one low power field in the myometrium when measured from the lower border of the endometrium (Figure 1). Additional criteria include the presence of cystically dilated glands and intraluminal bleeding residue in the glands (Figure 2). The adenomyosis was present in 158 patients (16.59%). The youngest patient who underwent hysterectomy was of 21 years of age, and the oldest patient was of 80 years of age. The mean age of the patients who underwent hysterectomy was 50.5 years. The majority (136 patients, 86.07%) of the patients with adenomyosis were in the age group of 30-49 years. Among these patients, 42 patients (26.58%) were in the age group

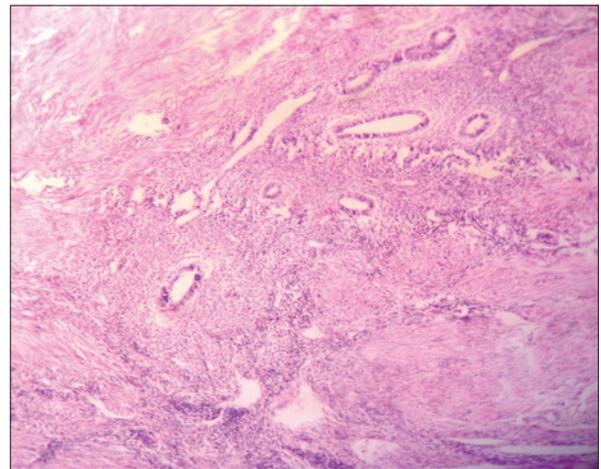


Figure 1: Photomicrograph is showing many endometrial glands and stroma lying deep in the myometrium, (H and E stain x4)

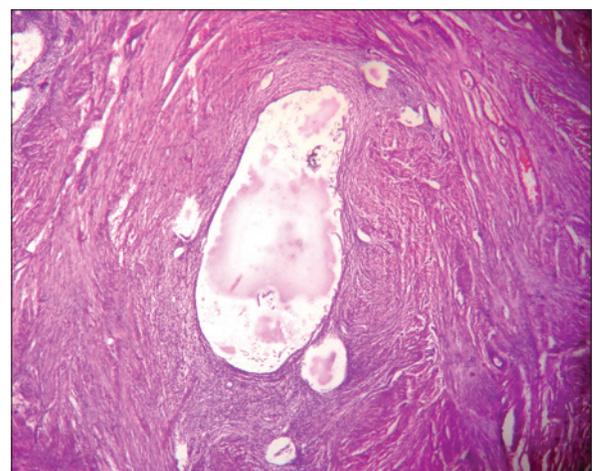


Figure 2: Photomicrograph showing endometrium with cystically dilated glands surrounded by hypertrophic smooth muscle bundles in the myometrium, (H and E stain x4)

of 31-40 years and 94 patients (59.49%) were in the age group of 41-50 years. Only 5 (3.16%) patients were in the age group of 21-30 years and 17 (10.75%) patients were in the age group of 51-80 years (Table 1).

Out of 158 patients, 78 (49.36%) patients had one or more associated co-morbid conditions. About 72 patients were associated with a single co-morbid condition. Among these patients 52 patients had associated leiomyoma of uterus, 5 patients had associated endometrial atrophy, 7 patients had associated endometrial hyperplasia without atypia, 2 patients had associated adenomatous polyp of endometrium, 2 patients had associated serous cystadenoma of ovary, 1 patient had associated mucinous cystadenoma of ovary, 1 patient had associated torsion of benign ovarian cyst, 1 patient had associated mature cystic teratoma of ovary, and one patient had associated cervical intraepithelial neoplasia (CIN) Grade III changes in the cervix. 7 patients of adenomyosis were associated with multiple co-morbid conditions. They include 1 patient with endometrial hyperplasia with atypia, leiomyoma of uterus, and serous cystadenoma of ovary; 1 patient with leiomyoma of uterus and endometriosis of ovary; 1 patient with CIN Grade III of cervix and adenomatous polyp of uterus; 2 patients with endometrial hyperplasia without atypia and leiomyoma of uterus; and 2 patients with leiomyoma and adenomatous polyp of uterus.

The risk of adenomyosis was high in women who complained of heavy menstrual flow in comparison with those patients who were reported to have normal menstrual flow and in patients who did not undergo dilatation and curettage. Likewise, patients who complained of dysmenorrhea and intermenstrual pelvic pain had increased the risk of adenomyosis. Most of the patients 149 (94.29%) were multiparous, and the majority of the patients were of parity 2 and 3. So, adenomyosis was more common among multiparous women. The pre-operative clinical diagnosis was dysfunctional uterine bleeding in 380 patients (39.91%), fibroid in 249 patients (26.15%), ovarian tumor in 41 patients (4.30%), utero-vaginal prolapse in 161 patients (16.91%), and post-menopausal bleeding in 121 patients (12.71%). Age of menarche, menopausal status, normal menstrual flow, and dyspareunia had no correlation with adenomyosis.

Table 1: Age-wise distribution of patients

Age in years	Numbers	Percentage
21-30	05	3.16
31-40	42	26.58
41-50	94	59.49
51-60	11	6.96
61-70	05	3.16
71-80	01	0.63

DISCUSSION

The true prevalence of adenomyosis is unknown but various factors such as genetic factor, hyperestrogenic state, increased the intrauterine pressure of pregnancy in parous women, and prior uterine surgery are proposed as possible etiological factors. In the present study of 952 women who had undergone hysterectomy, adenomyosis was seen in 158 patients (16.59%). Similar prevalence was reported in the study conducted by Shaikh (20.6%), Anwar Ali (20.6%), Sharqill *et al.* (26%), and Vavilis (24.9%). In our study, a total number of 136 patients in the age group of 31-50 years (89.47%) showed adenomyosis. Similar prevalence of adenomyosis for the age group of 31-50 years was reported in the studies by Anwar Ali (90%) and Sabin (95.5%). In our study, only 5 patients (3.16 %) were in the age group 21-30 years. Similar prevalence was reported by Sabin (2%) and Anwar Ali (1.6%) for these age groups. Our study also had adenomyosis in one patient (0.63%) between the age group of 71-80 years, 5 patients (3.16%) between the age group of 61-70 years, and 11 patients (6.96%) between the age group of 51-60 years.

In our study, 110 (69.60%) patients suffered from menorrhagia, 105 (66.45%) patients suffered from dysmenorrhea, 26 (16.45%) patients suffered from utero-vaginal prolapsed, and 7 (4.43%) patients suffered from post-menopausal bleeding (Table 2). In the study by Kheisat, 64% of patients suffered from dysmenorrhea and 3.92% of patients suffered from post-menopausal bleeding. In the study by Arunachalam *et al.*, 70.4% of patients suffered from menorrhagia, 18.4% of patients had utero-vaginal prolapse, and 2.8% of patients had post-menopausal bleeding.

In our study, 94.29% of patients with adenomyosis were multiparous women (Table 3). Similar study by Kheisat showed 96% parity of more than 3. Similar findings were observed in the study by Arunachalam *et al.* This fact favored the hypothesis that increased intrauterine pressure and invasive nature of trophoblasts in pregnancy probably facilitated implantation of endometrial tissue into the myometrium.

The pre-operative diagnosis of adenomyosis based on clinical signs and symptoms is very low. The observation by Reinhold showed the pre-operative clinical diagnosis of adenomyosis in 2.6-26% patients, and the study by Arunachalam *et al.* showed 21.2%. Similarly, in our study also pre-operative clinical diagnosis of adenomyosis was 18.4% and was made in the absence of a definite pre-operative diagnosis of uterine fibroid, utero-vaginal prolapse, or ovarian pathology in patients who presented with dysfunctional uterine bleeding, intermenstrual pelvic pain, etc.

Table 2: The symptoms in adenomyosis (overlap of symptoms)

Symptoms	No. of patients	Percentage
Menorrhagia	110	69.60
Dysmenorrhea	105	66.45
Metrorrhagia	52	32.90
Utero-vaginal prolapse	26	16.45
Post-menopausal bleeding	7	4.43
Intermenstrual pelvic pain	6	3.79
Dyspareunia	4	2.53

Table 3: Parity in patients with adenomyosis

Parity	No. of patients	Percentage
0	2	1.26
1	7	4.43
2	59	37.34
3	71	44.93
4	12	7.59
≥5	7	4.43

In our study, patients with adenomyosis had coexisting morbidities like fibroid (26.15%). Similar findings were observed in the studies by Gerson Weiss *et al.*; Shaikh *et al.* and Vavilis *et al.*

CONCLUSION

The prevalence of adenomyosis in hysterectomy patients was found to be 16.59% in our study. It was the most common seen in the age group of 31-50 years. It was also very common in multiparous women with a parity of more

than 2. The presenting symptoms of adenomyosis include menorrhagia, dysmenorrhea, metrorrhagia, intermenstrual pelvic pain, post-menopausal bleeding, and dyspareunia. Hence, clinical diagnosis of adenomyosis should be considered in patients presenting with these symptoms without any definitive evidence of uterine fibroid, utero-vaginal prolapse, or ovarian mass.

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Clinical Profile of Acute Myocardial Infarction in Elderly Patients: A Cross-Sectional Study

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Abstract

Introduction: Among elderly patients with acute myocardial infarction (AMI) it is noted that although chest pain is the most common presenting symptom, they can also present with atypical symptoms such as giddiness, dyspnea, vomiting, sweating, shoulder pain, and epigastric pain.

Aims: The aim of this study is to determine the clinical presentation, risk factors, and short-term complications in elderly patients with AMI.

Materials and Methods: This study is a descriptive cross-sectional study done over a period of 1 year including fifty elderly patients admitted to Father Muller Medical College Hospital with the diagnosis of AMI.

Results: Of the 50 patients, 42 patients (84%) complained of chest pain while 8 patients (16%) did not have chest pain at the time of presentation. Out of the 8 patients, atypical symptoms noted were dyspnea, giddiness, vomiting, sweating, and epigastric pain in the absence of chest pain.

Conclusion: Knowledge of these atypical presentations will help us to consider an acute cardiac event when the elderly present atypically.

Key words: Acute myocardial infarction, Atypical presentations, Chest pain, Elderly patients, Epigastric pain

INTRODUCTION

Coronary heart disease is the leading cause of death among elderly patients.¹ Previous studies have found that in patients with acute myocardial infarction (AMI), old age was associated with a higher prevalence of comorbid conditions, atypical presentation, non-diagnostic electrocardiogram (ECG), complications, and mortality.^{2,3}

Although, chest pain is the most common presentation of AMI in elderly patients, they are also known to present with atypical symptoms such as giddiness, dyspnea, vomiting, sweating, and epigastric pain in the absence of chest pain.^{4,5} Some investigators have found that

up to 30% of patients with AMI may not experience any symptom,⁶ and many experience no pain.⁷ These patients often complain of shortness of breath, extreme fatigue, nausea, or fainting. While some epidemiological studies identified women and advanced age in men as factors associated with unrecognized AMI,^{1,4} other reports identified diabetes mellitus.⁷ A study comparing the clinical presentation of AMI in patients aged more than 65 years with that of young patients showed that although chest pain was the most common presentation in both age groups it was less frequent in elderly (66.3% vs. 89.3%). The atypical presentations were seen more common in the elderly with shortness of breath as the most common atypical presentation (20.8% vs. 5.4% $P < 0.001$).⁸

Similarly, another study showed that while the majority of elderly patients with AMI had typical substernal chest pain (62%), 38% of elderly patients as compared to 4% of younger persons had either atypical pain that would be difficult to characterize as related to MI or no pain at all. The dyspnea was reported the more frequently by the

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elderly when compared to younger MI patients (58% vs. 48%).⁹

The absence of chest pain at presentation was among the most significant risk factors predicting lower use of thrombolytic therapy among a subset of AMI patients.¹⁰ Lack of chest pain during AMI has been linked to higher mortality rates. The excess mortality rates seen in patients with painless AMI can be at least partly explained by higher rates of congestive heart failure at presentation, possibly in conjunction with a longer delay between time of onset of ischemia to hospital arrival and poor symptom recognition by both patient and physician.¹¹

The proportion of women among elderly MI patients is greater compared to young MI patients.^{2,5} The possible reason could be a loss of estrogen and its cardiovascular effects in the elderly females.¹² Cardiovascular complications including cardiogenic shock, atrial fibrillation, and heart failure were common in elderly patients.¹³ Ventricular premature contractions and AV blocks were more common in elderly MI patients when compared to young MI patients. In aging persons, the atrioventricular conduction system is subjected to spontaneous fibrosis, and are more vulnerable to ischemia and necrosis.¹⁴ Cardiac rupture was significantly higher in elderly individuals. It was observed in a study that the mean age of those with cardiac rupture was 69 years.¹⁵

The aim of this study is to determine the clinical presentation, risk factors, and short-term complications of AMI in elderly patients. Knowledge of the differences of the clinical profile of elderly AMI patients in our population will help identify aspects which may need further evaluation to formulate strategies to improve outcome in elderly AMI patients.

Aims and Objectives

To study the clinical presentation, risk factors, and short-term complications of AMI in elderly patients.

MATERIALS AND METHODS

This study is a descriptive cross-sectional study done over a period of 1 year. Fifty elderly patients admitted to Father Muller Medical College Hospital with the diagnosis of AMI satisfying the inclusion criteria were included in the study using purposive sampling technique.

Inclusion Criteria

1. Age-60 years or above (ICMR guidelines)
2. Typical ECG pattern (ST segment elevation of 0.1 mV in at least 2 consecutive limb leads or 0.2 mV in at least

2 chest leads for ST elevation MI)

3. Elevated cardiac enzyme levels (CKMB or troponin T/I).

Exclusion Criteria

Patients with stable or unstable angina

Data of fifty consecutive elderly patients admitted to this hospital with the diagnosis of AMI were collected. History, examination and investigation findings were recorded in the performa. The complications that these patients developed in the hospital were recorded. The investigations done included fasting blood sugar, fasting lipid profile, ECG, chest X-ray, and 2D echocardiogram (ECHO).

RESULTS

Among the fifty patients, the majority of the patients belonged to the age group 60-69 years. Mean age was 69.82 years. 72% of the patients were males. Male to female ratio was 2.57:1. Of the 50 patients, 42 patients (84%) complained of chest pain while 8 patients (16%) did not have chest pain at the time of presentation (Table 1).

Only 58% of the patients presented to the hospital within 12 h of onset of symptoms. 16% presented in the next 12 h and the remaining presented 24 h after symptom onset.

Commonest risk factor found in this study was smoking seen in 58% of the patients included in the study. Next common was hypertension (36%) followed by hypercholesterolemia (30%).

CKMB was elevated in 70% of the patients. Among these, the values were found to be >100 U/dL in 14 patients. Troponin I was positive in 48% of patients.

Inferior wall MI was seen in 48% of the patients, anterolateral MI in 26% patients, and anteroseptal in 22% of the patients. Non-ST elevation MI was seen in 4% of the patients.

Out of the 50 patients, 2D ECHO showed left ventricular ejection fraction (LVEF) <45% in 44% of the patients. LVEF <25% was seen in 8% of patients. Mean LVEF was 38.11.

Table 1: Presenting symptoms of acute myocardial infarction noted in this study

Symptoms	Frequency	Percent
Chest pain	42	84.0
Giddiness	2	4.0
Dyspnea	3	6.0
Vomiting and sweating	2	4.0
Epigastric pain	1	2.0
Total	50	100.0

Only 50% patients were thrombolysed. The main reason for not thrombolysing the patients was delayed presentation to the hospital.

Among the complications noted during the hospital stay the commonest were acute pulmonary edema and arrhythmias seen in 14 and 16% patients, respectively. Arrhythmias noted were varying degrees of heart block, atrial fibrillation, and ventricular tachycardia. Mortality rate in this study was 18%. The mortality rates among patients presenting with and without chest pain are as depicted in Table 2.

DISCUSSION

In the present study, 72% of the patients were males with a male to female ratio of 2.57:1. In a study which compared the clinical profile of elderly MI patients with that of young patients it was seen that the male and female ratio was 3:1 in young MI patients while it was 1.37:1 in elderly MI patients.¹⁴ Similar observations were made in several other studies. Females constituted a larger percentage of patients in the elderly and very elderly age groups compared with the younger group.^{4,9}

Various authors have previously emphasized the variability in the clinical presentation of AMI in the elderly. Similar findings were noted in our study. In the present study although chest pain was the commonest symptom, 16% of the patients did not have chest pain at the time of presentation. The atypical presentations noted in our study were shortness of breath, giddiness, vomiting, sweating, and epigastric pain. In a study which compared elderly and young MI patients, atypical presenting symptoms were more likely in the elderly than in young patients (33.7% vs. 10.7%).⁸ Similarly, another study showed that patients more than 65 years were more likely to have atypical pain (38.2%) when compared to younger patients (4%).⁹

Only 58% of patients presented to the hospital within 12 h of onset of symptoms. This accounted for one of the major reasons for not thrombolysing the patients. Similar finding was noted in other studies.^{5,11,14}

In this study, among the risk factors, the commonest risk factor was smoking (58.8%). This was unlike the previous studies in which smoking was a less common risk factor in the elderly population. 36% of the patients were hypertensives, 30% had hypercholesterolemia, and 28% were diabetics. In one of the study done before, hypertension was commonly seen in elderly patients (39%). Smoking was seen in only 17.1% of the patients.¹⁴ A study which compared elderly and young MI patients observed that the young MI patients were more likely to be smokers (68.8% vs. 31.7%) and have hyperlipidemia (75.9%). However, there was no difference between the two age groups with regard to the presence of hypertension, diabetes mellitus, and history of prior myocardial infarction.⁸

In this study, 96% of patients had ST elevation MI and only 4% of patients had non-ST elevation MI. Unlike this, a study comparing elderly and young MI patients found that more than half of the elderly patients with MI had a non-diagnostic ECG.¹⁵ Similar observation was made in another study in which approximately 40% of elderly and very elderly patients did not demonstrate typical ST elevation with development of Q waves.⁵

A study conducted earlier showed that cardiac failure was a more common complication among elderly patients when compared to young MI patients. The older patients were also more likely to have some arrhythmias (23.6% vs. 8%).⁹ The most common complications noted in the study were acute pulmonary edema, cardiogenic shock, and arrhythmias.

CONCLUSION

This study shows that even though chest pain was the most common presentation in elderly AMI patients, they were also found to have atypical presentations such as shortness of breath, giddiness, vomiting, sweating, and epigastric pain. Knowledge of these atypical presentations will help us to consider an acute cardiac event when the elderly patients present with atypical symptoms.

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Table 2: Mortality with respect to presence or absence of chest pain

Chest pain	Mortality (%)		Total (%)
	Alive	Died	
Chest pain			
Absent	5 (12.2)	3 (33.3)	8 (16.0)
Present	36 (87.8)	6 (66.7)	42 (84.0)
Total	41 (100.0)	9 (100.0)	50 (100.0)

$\chi^2=1.133$, $P=0.287$, NS: Non-significant

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Evaluation of the Effect of Progesterone and Placebo in Parturient of Symptomatic Placenta Previa: A Prospective Randomized Control Study

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Abstract

Background: Antepartum hemorrhage and placenta previa effects majority of pregnant women endangering their life both maternal and fetal. Symptomatic placenta previa are being treated with tocolytic agents. Progesterone is the most common used drug for the preservation of pregnancy and aids in the extension of pregnancy.

Materials and Methods: A 80 patients were randomly assigned to two groups using computer-generated randomization. Group A (40 patients) received a placebo twice a week and Group P (40 patients) received injection 17 α -hydroxyprogesterone caproate (500 mg, IM). Various complications related to mother and fetus were compared in both the groups.

Result: Significant difference was seen in the elongation of pregnancy, gestational age at the time of delivery and birth weight of the fetus.

Conclusion: In the present study, 17 α OH progesterone use in the hopeful management of symptomatic placenta previa inclines to be valuable than placebo, thus reducing the maternal and fetal complications.

Key words: Placebo, Placenta previa, Pregnancy, Progesterone

INTRODUCTION

Antepartum hemorrhage (APH), also called as pre-partum hemorrhage, is genital bleeding in pregnancy from 24th week gestational age to the delivery of the baby. 3-5% of pregnancies worldwide are affected by APH, resulting in perinatal and maternal mortality. APH is found to be usually associated with placenta previa.¹

The placenta previa is defined as obstetric difficulty in which the placenta is implanted partially or solely in the lower uterine segment. Maternal mortality and perinatal mortality rate of roughly 0.03% and 8.1%, respectively,

are found in the developed world. This percentage is more in developing countries like India.² Large percentage of women according to literature experience uterine contractility before the beginning of unconcealed vaginal bleeding.³

The current study shows that symptomatic placenta previa are being treated with tocolytic agents.⁴ The progesterone is necessary for the preservation of pregnancy and aids in the extension of pregnancy. The progesterone, also known as pregn-4-ene-3, 20-dione is an endogenous steroid and involved in the menstrual cycle, pregnancy, and embryogenesis of humans. It is included in a steroid hormones group called as progestogens. The progesterone is also a key metabolic intermediate in the making of other endogenous steroids such as the sex hormones and the corticosteroids. They show a vital part in brain function as a neurosteroid.⁵ Reduction of the rate of long-term morbidity requires delayed delivery which facilitates the maturity of vital organs. Though the thorough mechanism of action is not known but proposed mechanisms were:

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(a) It acts principally through creating uterine inertness and upholds cervical length. It has immunosuppressive activity and stops consequence of oxytocin on myometrium. (b) It is a powerful inhibitor of gap junctions between myometrial cells. (c) Local fluctuations in progesterone or estrogen or progesterone ratio. (d) Suppression of calcium-calmodulin-myosin light chain kinase system, decreasing calcium flux and shifting the resting potential of smooth muscle are the root of progesterone action.⁶

This condition is also linked with decreased fetal birth weight. It should be reflected as a medical emergency, and medical consideration should be pursued immediately, as if it is left untreated it can lead to death of the mother, fetus, or both.^{7,8} The aim of the present study is to define the usefulness of intramuscular 17 α -hydroxyprogesterone caproate therapy versus placebo in the conventional treatment of patients with symptomatic placenta previa before 34 weeks of gestation. Various parameters like a prolongation of pregnancy and maternal results, i.e. the number of occurrences of bleeding, number of blood transfusion required, birth weight of babies, etc., and were noted to resolve the effect of progesterone.

MATERIALS AND METHODS

After obtaining Institutional Ethical approval 80 pregnant females of maternal age more than 18 years, singleton pregnancy, gestational age of the third trimester were recruited in our Department of Obstetrics and Gynecology with placental previa where placenta on ultrasonographic investigation was located around 5 cm of internal os or symptomatic (minimum one episode of bleeding) placenta previa were enrolled for our study. We excluded the patients with twin pregnancy, premature rupture of membranes, abnormal fetal heart rate (FHR) or severe maternal bleeding advocating early termination of pregnancy, intra-uterine death, abruption placentae, pre-eclampsia, chorioamnionitis, and patients suffering from severe renal or liver or heart disease.

After proper history taking, the examination was performed including the vital parameters were noted. The gestational age of both the groups were correlated both by clinical examination and by using ultrasonography. A skilled gynecologist executed the per-abdominal examination and assessed the parturient’s uterine tone, activity, tenderness, fundal height, liquor amount, FHS pattern, and fetal presentation. The type of presentation of placenta was diagnosed using ultrasonography.

The patients were randomly assigned to two groups using computer-generated randomization. Group A (40 patients)

received a placebo twice a week, and Group P (40 patients) received Inj. 17 α -hydroxy progesterone caproate (500 mg, IM). In the both study groups, the assigned drug or placebo as per study protocol were continued until the delivery of the baby or 37 weeks of gestation.

Both the groups received steroid prophylaxis before being enrolled in the study. The amount of bleeding and the neonatal outcome were observed in both the study groups.

Statistical Analysis

All the parametric data was analyzed using Student’s *t*-test and non-parametric data using Chi-square or Fisher test whichever is applicable. Data was analyzed using Statistical Package for Social Sciences version 19.0. A *P* < 0.05 was considered statistically significant.

RESULTS

Regarding baseline features such as maternal age, parity, gestational age at the time of admission, placenta previa type, and Hb% on admission showed no significant difference between IM progesterone group and placebo group (Table 1). However, the significant difference was seen in the elongation of pregnancy in progesterone

Table 1: Comparison of parameters of patients of two groups

Variable	Group A	Group P	P value
Age of mother (years) (mean \pm SD)	25.62 \pm 4.29	25.71 \pm 4.87	0.92
Parity (mean \pm SD)	1.19 \pm 1.21	1.24 \pm 1.22	0.85
Gestational age at admission (days) (mean \pm SD)	235.5 \pm 9.01	236.4 \pm 9.27	0.67
Placenta previa type			
Central	9	7	
Partial	8	4	
Marginal	14	17	
Low lying	9	11	0.69
Hb %	10.29 \pm 1.95	10.47 \pm 1.56	0.64

SD: Standard deviation, Hb: Hemoglobin

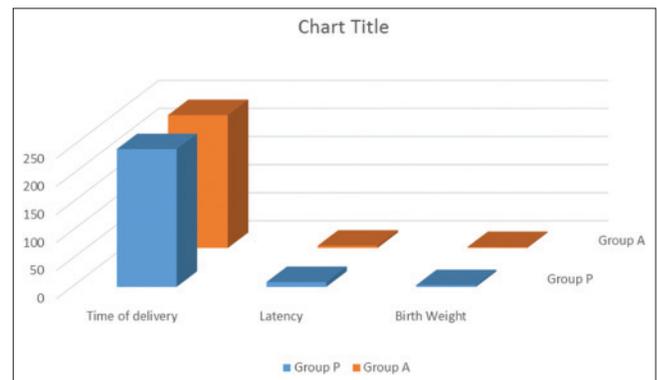


Figure 1: The parameters which showed significant differences in two groups

Table 2: Comparison of results of two groups

Variable	n=40		P value
	Group P	Group A	
Gestational age at the time of delivery (days) (mean±SD)	245.21±8.27	236.53±9.55	0.001*
Latency (days) (mean±SD)	8.49±3.65	4.01±2.41	0.001*
Birth weight (mean±SD)	2.95±0.93	1.52±0.84	0.001*
Blood transfusion required	6	8	0.77
Recurrent bleeding	31	35	0.38
NICU admission	12	19	0.16
Neonatal deaths	5	11	0.17

NICU: Neonatal intensive-care unit, SD: Standard deviation

accepting group as compared to the placebo group ($P < 0.001$). The gestational age at the time of delivery also showed a significant difference ($P < 0.001$). Maternal outcomes like episodes of bleeding and requirement of blood transfusion also showed no significant difference. Feature like the weight of a baby at the time of delivery showed a significant difference between two groups ($P < 0.001$). There was no substantial difference in NICU admission and neonatal death in control and study groups (Table 2).

DISCUSSION

Some studies^{9,10} have recommended that the prophylactic usage of progesterone lessens the rates of preterm birth in pregnancy. Besides these women with a single issue and with a positive history of spontaneous preterm birth, short cervix notified on ultrasound at 19-25 weeks gestation also requires the prophylactic use of progesterone. Both synthetic intramuscular 17 α -hydroxyprogesterone (17-OHPC) and natural vaginal micronized preparation have been studied.¹¹ The FDA permitted progesterone practice in 2011 and the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine mentioned it in their 2012 treatment guidelines.¹² The use of 17-OHPC in patients with placenta previa have been recommended in injectable form and not a vagina. Whereas in women with a short cervix (<20 mm) vaginal progesterone is the desired option. So in this study, IM progesterone was used in the patients.¹³

In our study, we found a significant difference in parameters like a prolongation of pregnancy and difference in birth weight in two groups. Similar findings were observed in 2004 in which use of ritodrine hydrochloride as tocolytic in symptomatic placenta previa exhibited significant elongation of pregnancy (25.33 vs. 14.47 days, $P = 0.05$) and variance in birth weight (2270 g vs. 1950 g, $P = 0.05$). Other parameters such as number of events of hemorrhage following admission, total quantity of blood loss during visit in hospital, blood transfusions numbers, and

maternal difficulties showed no difference supporting our outcomes.¹⁴

Similarly, another meta-analysis done by Bose *et al.* from 1995 to 2009 showed that pregnancy is extended for more than 7 days with continued tocolytics (odd ratio 3.10, 95% of confidence interval [CI] 1.38-6.96).¹⁵

A Cochrane review published in 2013 concised the progesterone effect in women with a past history of preterm birth grounded on 11 RCTs that involved 1899 patients. The progesterone was allied with a decreased risk of preterm birth at <34 weeks (relative risk [RR] 0.31, 95% of CI 0.14-0.69) and perinatal mortality (RR 0.50, 95% of CI 0.33-0.75). Along with this decreased rates of infants, low birth weight <2500 g, neonatal death, necrotizing enterocolitis, and admission to a neonatal intensive care unit was observed.¹⁶

The preterm birth mechanism in multiple pregnancies is probably related to uterine distension. Some authors have advised that asymptomatic twin pregnancies may need increased doses of progesterone in order to be effective at falling preterm birth in a similar way to singleton pregnancies.¹⁷ So, further research is required to decide the doses of progesterone in different pregnancies.

Recently, protection concerns have been upraised about the issue of use of 17-OHPC. In a study, encompassing women with triplet pregnancies, the group getting weekly injections of 250 mg 17-OHPC experienced 13 mid-trimester fetal fatalities ver. none in the placebo group ($P < 0.02$).¹⁸ In alternative study¹⁹ of twin pregnancies in women with a short cervix, treatment with 17-OHPC was connected with a substantial increase in the rate of preterm birth at <32 weeks (29% vs. 12%; $P = 0.007$).

CONCLUSION

In the present study, 17 α OH progesterone use in the hopeful management of symptomatic placenta previa inclines to be valuable than placebo. However, there is inadequate research in this field. So, the prospective randomized clinical trials with a huge number of patients are mandatory to further search the efficiency of progesterone in the symptomatic placenta previa.

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Evaluation of Oxidative Stress Marker Malondialdehyde Level in the Cord Blood of Newborn Infants

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Abstract

Introduction: Due to high energy demand for growth of the fetus, a mother takes large amount of oxygen for metabolic functions. This oxygen in excess can lead to many pathological conditions and have oxidative stress. Malondialdehyde level in the umbilical cord blood of newborn is indicative of oxidative stress during the perinatal period. The extent of free radical-induced oxidative stress can be enhanced by the decreased efficiency of an antioxidant mechanisms. The present study was conducted to investigate the extent of oxidative stress in cesarean section (C/S) and normal vaginal delivery (NVD).

Materials and Methods: Plasma thiobarbituric acid reactive substances (TBARS) were analyzed in the circulations of 30 umbilical cord blood of neonates born via C/S and NVD.

Results: Significantly increased concentrations of plasma TBARS, were observed in cord blood of C/S than NVD and was significantly high ($P \leq 0.0001$). Increase levels of lipid peroxidation may be due to excessive oxidative stress.

Conclusion: Our study shows that both the mother and their newborn in C/S are exposed to higher oxidative stress as compared with NVD.

Keywords: Cord blood, Malondialdehyde, Peroxidative stress

INTRODUCTION

It is said pregnancy gives new birth to mothers as it deals with strong pains and aggressive episodes of systemic changes in metabolism and physiology of the body. It shows unforgettable and severe pain events occur during this period for sustaining mother and fostering the growth and maintenance of fetus.¹ Due to high energy demand for growth of the fetus, mother during pregnancy takes large amount of oxygen for metabolic functions. This oxygen very necessary but can be toxic if in excess and cause oxidative stress. Many pathophysiological conditions may

have oxidative stress. In normal conditions, it is balanced by the antioxidant system but during labor this balance is disturbed due to increased oxidative stress. Malondialdehyde (MDA) is the best indicator of lipid peroxidation and so of oxidative stress. The oxidative stress shows important role in the pathogenesis of many diseases.² The antioxidants are the substances that reduce oxidation of substrates and constitute the body's main protection against free radicals injury. Reducing the oxidative stress by supplementation of antioxidant could be an effective option to prevent oxidative stress.³ The oxidative stress caused by more and more free radical formation and due to decreased antioxidant level in the target cells and tissues has been noted to play a valuable role in carcinogenesis.^{4,6} The levels of free radicals molecules are ruled by various cellular defense mechanisms consisting of enzymes such as catalase, superoxide dismutase, glutathione peroxidase, and glutathione components.⁷ The perinatal period is a significant period which affects the rest of the newborn's life. Although the relation between mother-related factors (the presence of systemic diseases

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such as preeclampsia and hypertension), birth-related factors (low gestational age, low Apgar score, presence of hypoxic-ischemic encephalopathy, etc.), and exposure of newborns to oxidative stress has been discussed in previous studies, there is an insufficient number of studies that have been conducted on this issue.⁸ The study done by Gülbayzar *et al.* showed that in the emergency cesarean section (C/S) group, the MDA level was statistically and significantly high in newborns with a low ponderal index; hence, they showed that it serve as an indicator of intrauterine growth retardation. They also showed that in the emergency C/S group, the MDA level was statistically and significantly higher in babies with low hemoglobin and hematocrit values in the cord blood. They showed that anemia accompanies many pathological processes of the neonate and shows negative effects on prognosis; this fact revealed through increasing MDA levels as an indicator of oxidative stress.⁹ D Weber *et al.* concluded that oxidative stress (elevated PrCarb) was associated with lower BW/head circumference and small to gestational age (SGA). They explained that incomplete hemodilution showed inverse relation of maternal retinol with baby weight and head circumference, and showed that the association between highest maternal retinol had risk for SGA.¹⁰ Studies have shown that the serum concentration of 8-isoprostane, which one of the oxidative stress indices connected with vessel constriction has been increased in women diagnosed as having intrauterine growth restriction (IUGR).¹¹ It has been reported by some workers that during pregnancy complicated by IUGR, MDA concentration in amniotic fluid was almost three times more than in normal pregnancy.¹² Studies have also showed that gravidas with poor pregnancy had increased oxidative damage to their DNA.¹³ The oxidative DNA damage was increased in mothers with pregnancy complicated by IUGR.¹⁴ The result of the study conducted by Kamath *et al.* (2006) indicates that oxidative stress was induced in IUGR babies and their mothers indicating an increased lipid peroxidation and protein oxidant damage.¹⁵ The study done by Dolapo *et al.* showed significant negative correlations between placenta weight and MDA ($r = -0.25$; $P < 0.05$), between birth weight and MDA ($r = -0.56$; $P < 0.05$).¹⁶ The present study is aimed to determine oxidative stress at the time of delivery.

MATERIALS AND METHODS

The case-control study was conducted and following information was recorded: Mode of delivery, the age of mother, sex of baby, parity, and weight of the baby. A total of 30 healthy neonates (following healthy normotensive pregnancy) were included in the study which were divided on the basis of mode of delivery as normal vaginal delivery (NVD) ($n = 20$) and C/S ($n = 10$).

Inclusion Criteria for Mothers

Healthy mother only on iron folic acid and calcium supplementation were included.

Exclusion Criteria for Mothers

History with alcoholism, smoking hypertension, thyroid disorders, diabetes mellitus, renal diseases, hypercholesterolemia, twins, liver diseases, tuberculosis and asthma, and pregnancy-induced hypertension were excluded.

Inclusion Criteria for Neonates

Gestational age between 35 and 42 weeks and absence of congenital anomalies were included.

Exclusion Criteria for Neonates

Congenital malformations, neonates born to the mother with maternal illness, neonates with perinatal problems such as hypoglycemia, pathological jaundice, and instrumental delivery including extraction, and also neonates with hypoxic ischemic encephalopathy and sepsis were excluded.

Sample Collection

After delivery and cord clamping umbilical venous blood was taken from the maternal umbilical end. Serum was separated and analyzed for MDA. The plasma MDA level was determined by a method of Yagi.¹⁷

Statistical Analysis

The results are given as mean \pm standard deviation (SD) values. The significance of the mean difference between groups was assayed by the unpaired *t*-test and was correlated by using Pearson correlation coefficient.

RESULTS

The age of all the pregnant women was between 22 and 31 years. They all delivered at the gestational age of between 36 and 40 weeks. In our study, out of 30 total newborn, 12 (40%) were male child and 18 (60%) were female child, all were full term newborn. Out of 30 cases, 10 were cesarean cases, and 20 were NVD cases. Mean age of mothers were 24.6 years. No significance statistically was found between maternal age, parity, environmental factors like rural-urban or tribal – non-tribal (Tables 1 and 2).

Table 1: Characteristic of newborn

Parameter	NVD $n=20$ (%)	C/S ($n=10$)	Total ($n=30$)
Gender			
Male	6 (20)	6	12
Female	14 (46.6)	4	18
Birth time			
Preterm	-	-	-
Term (36-40 weeks)	20	10	30

NVD: Normal vaginal delivery, C/S: Cesarean section

Mean MDA level in cord blood in the NVD is 4.38 ± 0.28 , whereas in C/S it was 6.47 ± 0.51 which was highly significant ($P < 0.0001$). The male child with NVD had mean \pm SD values as 4.35 ± 0.25 and in female as 4.38 ± 0.28 , whereas in C/S it was 6.19 ± 0.48 and 6.90 ± 0.10 in male and female child (Table 3).

Table 4 shows the correlation among the measured variables. There were positive correlations between gestational age and NVD ($r = 0.047$; $P = 0.84$), birth weight and NVD ($r = 0.08$; $P = 0.73$), Furthermore, there were negative correlations between NVD and C/S MDA ($r = -0.25$; $P = -0.46$), between gestational age and C/S MDA ($r = -0.61$; $P = -0.05$), between birth weight and C/S MDA ($r = -0.470$; $P = -0.16$).

DISCUSSION

All neonates were full term normotensive (36-42 weeks) born. This has lead to nullify the effect that gestational age has on oxidative stress. The studies showed increase oxidative stress as pregnancy advances.^{18,19} The age range of mothers included was not above 40 years. The effect of aging factor on our selected biochemical parameter was also exempted. All neonates were born through spontaneous vertex delivery bearing in mind the effect that different mode of deliveries could have on oxidative stress.²⁰ It has been showed that babies born through elective C/S have less oxidative stress than those born through spontaneous vertex delivery. This has been due to the stress of labor the baby passes with and some pains may even be prolonged.²¹

The oxidative stress in babies develops the same way it develops in the adult. This is as a result of the generation of free radical in excess. Free radicals like reactive oxygen species when they attack cellular polyunsaturated membrane lipid, a chain reaction occurs. These reactions go on until when scavengers of free radicals act on. These scavengers are

antioxidants available and in fact mechanism is widely studied. Our study considered the measurement of plasma MDA to see the extent of free radical injury (lipid peroxidation).^{22,23}

The role of oxidative stress in various pathological conditions has been recently burning topic of discussion. An increase MDA is indicator of oxidative stress in adult and children and shows that newborns antioxidant defense system is ineffective to fight against oxidative stress. An increase in MDA is an indicator of oxidative stress has been studied in various pathological conditions both in adults and children.²⁴ Newborn's antioxidant defense system is insufficient hence oxidative damage results. MDA level is one of the biochemical parameters of this stress. The study done by Denisa *et al.* showed that lipid peroxidation in blood plasma might be activated. Arikian *et al.* has shown in their study that lipid peroxidation and antioxidant status have been changed during delivery, and these changes affect the fetus by creating oxidative stress.^{25,26} Gülbayzar *et al.* showed mean SD levels in cord in the NVD, emergency C/S group, and elective cesarean group and the values were 2.03 ± 0.42 nmol/mL, 2.21 ± 0.95 nmol/mL, and 0.92 ± 0.29 nmol/mL, respectively. They also found levels as significantly higher when compared to that in the elective cesarean group.⁹ Mocatta *et al.* determined that cord blood MDA levels in elective C/S were lower as compared to those of NVD. Yigit *et al.* also showed that cord blood MDA levels in neonates born via spontaneous vaginal delivery were higher compared to those born via C/S.^{27,28} In another study, the role of perinatal distress on the production of oxygen radicals and on lipid peroxidation was determined and an increased MDA level, regardless of gestational age, in neonates delivered via C/S compared to borned via spontaneous vaginal delivery.²⁹ Our result also shows oxidative stress in cesarean delivery time. The MDA level was significantly higher ($P < 0.0001$) in cord blood during C/S than vaginal delivery. Our results agree with results of Siddiqui *et al.* Their MDA level was higher in C/S than NVD.³⁰ Since MDA is direct adduct of polyunsaturated fatty acids (PUFA) this are essential constituents of cellular membrane lipids and many other cellular components, three deductions can be made, (a) Membrane lipids may be more damaged in C/S than NVD, (b) PUFA located in other cellular or extracellular compartment are more damaged and, (c) else both are partly damaged. We would like to emphasize that damage need not to be necessarily expressed in the form of pathology because tissues are always in the state of

Table 2: Characteristic of mother

Parameter	NVD	Cesarean
Age of mother (mean)	24.9 years	24.00 years
Parity		
1	2	2
2	12	4
3	6	4

NVD: Normal vaginal delivery

Table 3: Comparison of mean \pm SD levels of MDA in NVD and C/S

Parameter	NVD			Cesarean delivery		
	Male	Female	Total	Male	Female	Total
MDA (nmole/mL)	4.35 \pm 0.25*	4.38 \pm 0.28	4.38 \pm 0.28	6.19 \pm 0.48	6.90 \pm 0.10	6.47 \pm 0.51*

* $P \leq 0.0001$, highly significant. SD: Standard deviation, NVD: Normal vaginal delivery, C/S: Cesarean section, MDA: Malondialdehyde

Table 4: Correlation of MDA with other parameters

MDA	NVD		Cesarean delivery	
	R	P	R	P
Birth weight	0.08	0.73	0.479	0.161
Gestational age	0.047	0.841	0.617	0.057

NVD: Normal vaginal delivery, MDA: Malondialdehyde

dynamic equilibrium and possess an effective repair system. Our results show that the women and their newborns in C/S are under oxidative stress rather than in NVD.

CONCLUSION

Our study shows that both the mother and their newborn in C/S are exposed to higher oxidative stress as compared with NVD. The antioxidant system of mother is insufficient to fight up with oxidative stress. NVD is advantageous than C/S in regard to oxidative stress.

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Hepatitis B and Hepatitis C Virus Co-infection among Human Immunodeficiency Virus Infected Patients of Tripura

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Abstract

Background: India has the third largest number of individuals with human immunodeficiency virus (HIV)/acquired immune deficiency syndrome after South Africa and Nigeria. Co-infection of HIV with the hepatitis B virus (HBV) and the hepatitis C viruses (HCV) is a common event due to the similar routes of transmission. The study is designed to evaluate the status of co-infection by HBV, HCV virus among HIV infected patients of Tripura.

Materials and Methods: In this cross-sectional prospective study, serological status for HBV and HCV was performed on 453 HIV-positive individuals.

Results: Out of 453 HIV-positive patients 17 patients were positive for hepatitis B surface antigen, i.e., 3.75% and there was male preponderance male being 88.23% and female 11.76%. Two patients (0.44%) were positive for the anti-HCV antibody and both of them were male. There was no dual infected patient found, and the route of transmission was heterosexual.

Conclusion: This may be related to the high heterosexual mode of transmission. The reduced co-infection decreases the possibility of complication among HIV infected patients of Tripura.

Key words: Co-infection, Hepatitis B, Hepatitis C, Human immunodeficiency virus

INTRODUCTION

India now has the third largest number of individuals with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) after South Africa and Nigeria.¹ Co-infection of HIV with the hepatitis B virus (HBV) and the hepatitis C virus (HCV) is a common event due to the similar routes of transmission.² The national HIV prevalence is 0.8% and there are certain areas such as Maharashtra, Andhra Pradesh, Tamil Nadu, Karnataka, Manipur, and Nagaland that account for over 80% of all the reported AIDS cases in the country.³

HIV, HBV, and HCV are the three most common chronic viral infections documented worldwide.^{4,5} These viruses have similar routes of transmission, namely through blood and blood products, sharing of needles to inject drugs and sexual activity, enabling co-infection with these viruses a common event.⁶⁻⁸

HBV and HCV co-infections in HIV-positive individuals is of utmost importance due to the underlying consequences such as the hepatological problems associated with these viruses, which have been shown to decrease the life expectancy in the HIV infected patients,⁹ and it may further complicate the treatment of HIV-infected patient.

The co-infection pattern of these viruses showed that 10.0% of the HIV infected population estimated to have chronic HBV infection and around a third estimated to have chronic HCV infection worldwide.^{9,5} However, studies reported,¹⁰⁻¹³ that the rates of co-infection of HIV with

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either HCV or HBV vary from region to region, study population, and risk factors for HIV acquisition.

Despite the effective decline of the mortality and morbidity rate from HIV/AIDS as the result of highly active antiretroviral therapy (HAART), liver diseases due to chronic HBV and HCV infections may become a leading cause of death. The complex interactions between HIV-HBV/HCV co-infection and HAART are increasingly apparent in HIV disease progression.¹⁴

In HIV-HBV co-infections, HIV infection causes increased rates of persistent HBV infection, increased cirrhosis and liver-related mortality, and increased the risk of hepatocellular carcinoma at lower CD4T cell counts.¹⁵ Similarly in HIV-HCV co-infections, there is a more rapid progress to cirrhosis, end-stage liver disease and hepatocellular carcinoma.¹⁶

The impact of HBV and HCV could not be limited in causing liver hepatotoxicity but also results in failure in immunological recovery in HIV-positive patients. A study in Tanzania reported slow rate of immunologic recovery after initiation of HAART treatment and higher risk of hepatotoxicity among HIV/HBV and HIV/HCV co-infected patients.¹⁷

Thus, the management of HBV and HCV in HIV infection is complicated and bring high burden in particular where HIV is rampant. As the result, globally HIV, HBV, and HCV become the major public health concerns.^{18,19} In some countries, screening of HIV infected individuals for HBV and HCV is highly recommended before initiation of antiviral treatment.⁸

So, in this study, we have screened all the HIV infected patients attended the Anandalok Community Care Center, Agartala, Tripura.

Aim

To evaluate the status of co-infection by HBV and HCV virus among HIV infected patients of Tripura.

Objectives

1. To know the prevalence of HBV and HCV co-infection among HIV- positive patient
2. To identify the route of transmission among co-infected patient.

MATERIALS AND METHODS

After Ethical Clearance from Ethical Committee of Agartala Government Medical College and a valid written consent from all patients was taken. It was cross-sectional

prospective study and the study period was October 2008-March 2013. All patients who attended the Anandalok Community Care Center, Agartala, Tripura during the period were evaluated by close ended questionnaire, clinically and along with all relevant investigation.

Inclusion Criteria

1. All HIV-positive patients attended the Anandalok Community Care Center since October 2008-March 2013
2. Who has given consent for this study?

Exclusion Criteria

1. Who has not given consent for this study?

All patients had undergone hepatitis B surface antigen (HbsAg) and anti-HCV blood test for evaluation of their HBV and HCV status. Further evaluation was also done for planning of treatment.

All the patients are initially tested for the HbsAg and anti-HCV antibody by the enzyme-linked immune-sorbent assay (ELISA). The positive sera were confirmed by a repeat ELISA. The cut-off value for reporting the positive results was calculated as per the manufacturer’s direction.

Data Analysis

Data was analyzed by frequency distribution.

RESULTS

During the study period since October 2008-March 2013 total 453 HIV-positive patients attended the center. Out of which 311 were male and 142 were female, male tendency ratio being 68.65%.

Out of 453 HIV-positive individual 17 were positive for HbsAg, i.e., 3.75%. The prevalence of HCV among HIV infected patients was only 0.44% (Figure 1).

Among the HBV positive patients, there was a male preponderance male being 88.23% (15) and the female was 11.76% (2) (Figure 2).

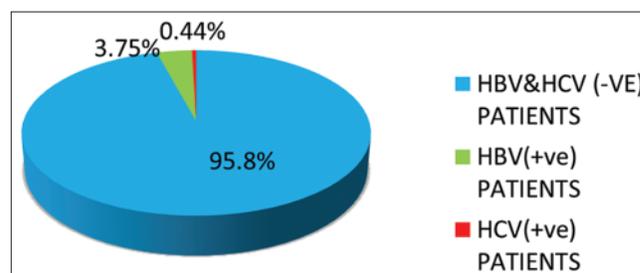


Figure 1: Proportion of co-infection

As per as age is concern 16 positive patients, i.e., 84.21% were in between 20 and 40 years of age and three patients, i.e., 15.78% were above 40 years of age. No positive patient found below 20 years (Figure 3).

The source of HBV infection in all the patients were heterosexual mode and majority of them infected from female sex worker (FSW) through unprotected sex.

Central government employee mainly paramilitary forces were HBV co-infected more (47%) than the others and the source was from FSW.

Maximum (47%) HBV-positive patients from the North district followed by (29%) from Dhalai district.

Both HCV-positive patients were infected from FSW. There was no significance cause of HIV, HBV, and HCV co-infection in the study group. There was no dual positive (HBV and HCV) patient found (Figures 4 and 5; Table 1).

The detail about our results is summarized in Table 2.

DISCUSSION

Blood borne viruses HIV, HBV, and HCV have the similar route of transmission and hence the possibility of co-infection is very high. Within India HBV and HCV co-infection among HIV infected patients has been variable from region to region.²⁰⁻²²

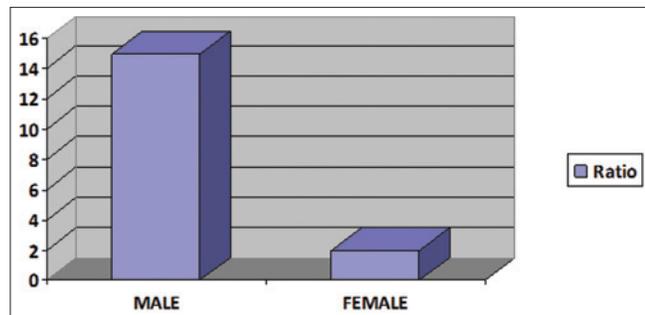


Figure 2: Sex distribution of HBV positive HIV Patients.

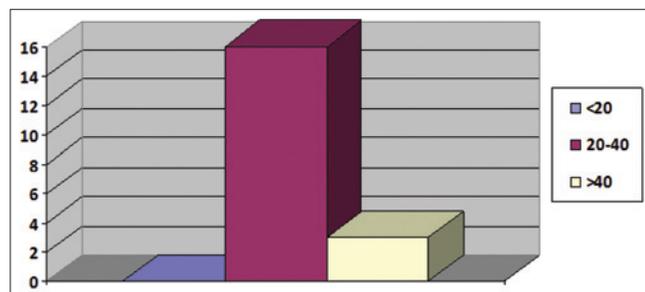


Figure 3: Age distribution of HBV positive HIV Patients.

Hooja *et al.* in tertiary care hospital in northwest India found that HBV and HCV co-infection among HIV infected patients were 10.5% and 1%, respectively.²⁰

Tripathi *et al.* in northern India found that HBV and HCV co-infection among HIV infected patients were 2.25% and 1.61%, respectively.²¹

HIV-HBV co-infection among individuals attending the ICTC of a Tertiary Care Hospital in West Bengal, India done by Sarkar *et al.* was 8.3%.²²

However, we have found HBV prevalence among HIV infected patients in Tripura is 3.75% which is almost similar to HBV prevalence (3.8%) among the general population of Tripura. Heterosexual mode of transmission has been the common mode in our state.

Whereas HCV positivity (0.44%) is further very low probably due to low intravenous (IV) drug use by sharing needle in our state. HCV co-infection is also probably through the heterosexual route.

The co-infection is usually complicated the clinical situation, treatment modality, and the prognosis of patients.

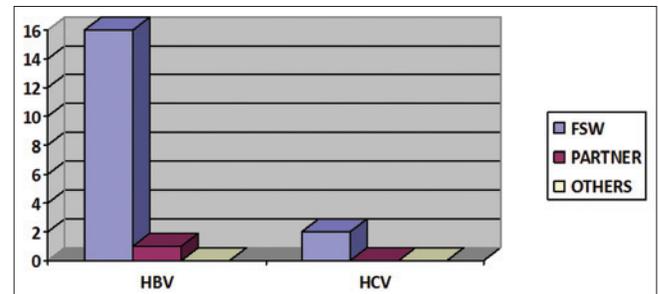


Figure 4: Source of hepatitis B virus and hepatitis C virus infection

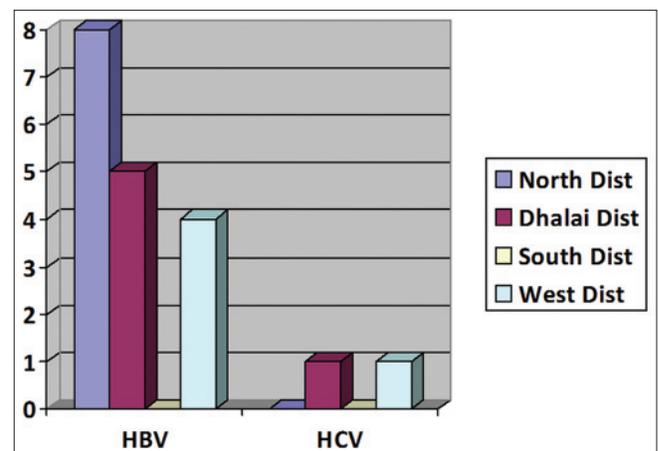


Figure 5: Number of case distribution according to district

Table 1: Socio demographic distribution of cases

Demographic	HBV	HCV
Age		
<20		
20-40	14	2
>40	3	
Sex		
Male	15	2
Female	2	
Religion		
Hindu	13	2
Muslim	1	
Christian	2	
Others	1	
Area		
North district	8	
Dhalai district	5	1
South district		
West district	4	1
Occupation		
Central government	8	
State government	4	2
Others	5	
Source		
FSW	16	2
Partner	1	
IV drug user		
Blood transfusion		

IV: Intravenous, HBV: Hepatitis B virus, HCV: Hepatitis C virus

Table 2: Summary of present study

Groups	Total	Age (years)	Male	Female	Frequency (%)
HIV alone	434	36.44	294	140	95.8
HIV+HBV	17	35.35	15	2	3.75
HIV+HCV	2	37	2		0.44
HIV+HBV+HCV					

HBV: Hepatitis B virus, HCV: Hepatitis C virus, HIV: Human immunodeficiency virus

The source of HBV and HCV co-infection among HIV infected patients is through sexual route. As the IV drug use in Tripura is very low, so HCV co-infection is very low in our state because HBV and HCV mainly transmitted by blood born route further, sexual transmission of HCV is uncommon.²³

CONCLUSION

HIV, HBV, and HCV are transmitted through the similar route but in Tripura HIV, HBV, and HCV co-infection is less, which is probably due to the mainly heterosexual mode of transmission. The reduced co-infection decreases the possibility of hepatic complication among HIV infected patients of Tripura.

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Dysnatraemia in Heart Failure: A Descriptive Study

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Abstract

Background: Sodium concentrations affect three-dimensional conformations of proteins and enzymes and thus, play a critical role in maintaining electrical gradients across cellular membranes and in muscular excitation. It is within the realms of possibility that these small changes in sodium concentrations may have attenuated deleterious effects on cardiac muscle function in patients with heart failure.

Objectives: The objectives were to estimate proportion of dysnatraemia in heart failure and to look for correlation between the serum sodium levels with left ventricular ejection fraction (LVEF), systolic blood pressure (SBP), blood urea, and serum creatinine levels.

Materials and Methods: The study included 50 patients of heart failure of any cause and severity admitted to K.R. Hospital.

Results: The prevalence of dysnatraemia was 30%, 24% had hyponatremia and 6% had hypernatremia. Mean diastolic blood pressure (DBP) was lower in patients with hyponatremia. Mean SBP was lower in patients with hypernatremia. Mean LVEF was lower in patients with hypernatremia. The mean LVEF was lower in patients with low normal sodium levels (135-139 mmol/L) ($P < 0.019$), whereas LVEF was preserved in patients with high normal sodium levels (140-145 mmol/L). Pulmonary artery hypertension (PAH) was present in 88.33% of patients with hyponatremia ($P < 0.0495$). Mean blood urea and mean serum creatinine were higher in patients with hypernatremia. Mean glomerular filtration rate (GFR) was lower in patients with hypernatremia.

Conclusion: Dysnatraemia is a common occurrence in patients with heart failure, with hyponatremia being common. The hypernatremia is associated with lower LVEF, lower SBP, higher blood urea and higher serum creatinine, and lower estimated GFR. The hyponatremia is associated with PAH and lower DBP. LVEF is preserved in patients with high normal sodium levels.

Key words: Blood urea, Glomerular filtration rate, Heart failure, Hypernatremia, Hyponatremia, Left ventricular ejection fraction, Serum creatinine, Sodium, Systolic blood pressure

INTRODUCTION

Development of symptomatic heart failure carries a poor prognosis. Community-based studies indicate that 30-40% of patients die within 1 year of diagnosis, and 60-70% die within 5 years mainly from worsening heart failure.¹

Normal serum sodium level ranges from 135 to 145 mmol/L. The sodium concentrations affect three-dimensional conformations of proteins and enzymes

and, thus, play a critical role in maintaining electrical gradients across cellular membranes and in muscular excitation.² It is within the realms of possibility that these small changes in sodium concentrations may have attenuated deleterious effects on cardiac muscle function in patients with chronic heart failure. Several studies have indicated the relationship between admission serum sodium concentration and clinical outcomes in patients hospitalized for heart failure.³⁻¹⁸ Both hyponatremia and hypernatremia indicate a markedly compromised prognosis in heart failure regardless of left ventricular ejection fraction (LVEF). Within the normonatremic patients, patients with the high normal range (i.e., 140-145 mmol/L) carries good prognosis compared with those with the low normal range (i.e., 135-139 mmol/L). It has been found that hyponatremia was independently associated with higher urea levels, higher New York Heart Association

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(NYHA) class, lower systolic blood pressure (SBP), and lower ejection fraction. Emergency admissions were also correlated with hyponatremia.¹⁹ The hyponatremia also predicts cardiorenal syndrome which occurs in heart failure. Due to complex physiology of heart failure, the effects of loop diuretics on serum sodium can be difficult to accurately predict thus making frequent monitoring of serum sodium very important.²⁰

Hence this study was done to know the prevalence of dysnatraemia in heart failure as studies on prevalence of hyponatremia in heart failure are lacking, and to find out the correlations between serum sodium measured at the time of admissions with other variables as mentioned in objectives.

Aims and Objectives

1. To measure the serum sodium levels at the time of admission and to estimate proportion of dysnatraemia in heart failure patients
2. To correlate between serum sodium levels measured at the time of admission with the LVEF as determined by two-dimensional (2D) echocardiogram during hospital stay
3. To correlate between the serum sodium levels with other variables such as SBP, blood urea levels, and serum creatinine levels at the time of admission in heart failure patients.

MATERIALS AND METHODS

The present study was conducted on 50 patients with heart failure of any cause and severity admitted to cardiology ward, K.R Hospital, Mysore attached to Mysore Medical College and Research Institute during the period of November 2012-August 2014.

Inclusion Criteria

The patients diagnosed with heart failure that are older than 18 years of age.

Exclusion Criteria

1. The patients with conditions causing hyponatremia like - Vomiting, diarrhea, salt-losing nephropathy, diabetic ketoacidosis, cirrhosis, nephrotic syndrome, syndrome of inappropriate antidiuretic hormone secretion, glucocorticoid deficiency
2. The patients with conditions causing hyponatremia such as - Chronic kidney disease and diabetic insipidus.

Method of Study

The study was of descriptive or exploratory in nature. Purposive sampling technique was used as a sampling method. Data was collected using a pretested proforma

meeting the objectives of the study. The cases for the study were selected in accordance with the above-mentioned inclusion and exclusion criteria. The purpose of the study was explained to the patient, and informed consent obtained. Detailed history, clinical examination and the following investigations such as electrocardiogram, chest X-ray posterior-anterior view, renal function tests, 2D echocardiogram, and other relevant tests were carried out.

In the present study, blood urea was measured using the urease glutamate dehydrogenase method and serum creatinine was measured using Jaffey kinetic method. Estimated glomerular filtration rate (GFR) was calculated using Cockcroft-Gault equation. The serum sodium was measured using easy lyte plus analyzer (method used - direct measurement by ion selective electrode). LVEF was calculated using the modified Simpson's rule. The pulmonary artery systolic pressure was estimated using tricuspid regurgitation jet method. In the present study, patients with pulmonary artery systolic pressure more than 35 mmHg are considered to have pulmonary artery hypertension (PAH).

Statistical Methods

Data was analyzed statistically using descriptive statistics, Chi-square test, product-moment correlation, and cross-tabulations using SPSS (version 20.0).

RESULTS

In the present study, 50 patients of heart failure were included; all of them were in decompensate state at the time of admission (NYHA 4 Class). The serum sodium measured at the time of admission were categorized into normal (135-145 mmol/L), hyponatremia (<135 mmol/L), and hyponatremia (more than 145 mmol/L) (Table 1). The age of patients ranged from 28 to 85 years with mean age of 58.18 ± 13.64 years. Male to female ratio in the present study of heart failure patients was 1:1. In our study, ischemic heart disease was the most common risk factor for heart failure (68%) followed by chronic obstructive pulmonary disease (COPD)/asthma (48%), hypertension (28%), and diabetes mellitus (28%).

Mean SBP was lower in patients with heart failure with hyponatremia (120.0 ± 36.0 mmHg) compared to those with hyponatremia (129.2 ± 27.5 mmHg) and those with normal sodium values (129.0 ± 20.7 mmHg).

Mean diastolic blood pressure (DBP) was lower in patients with heart failure with hyponatremia (80.0 ± 12.8 mmHg) compared to those with hyponatremia (83.3 ± 25.2 mmHg) and those with normal sodium values (81.4 ± 14.2 mmHg).

Table 1: General characteristics of study population

Variable	Hyponatremia (<135 mmol/L)	Normonatremia (135-145 mmol/L)	Hypernatremia (>145 mmol/L)
Number of patients	12	35	03
Women (n)	07	18	00
Mean age	54.75±13.34	58.48±13.92	68.33±7.63
IHD (n)	06	25	03
DM (n)	01	13	00
COPD/asthma (n)	09	15	03
Mean HR	99.7±10.8	101.7±9.3	102.0±7.2 (<i>P</i> <0.81)
Mean SBP	129.2±27.5	129.0±20.7	120.0±36.0 (<i>P</i> <0.808)
Mean DBP	80.0±12.8	81.4±14.2	83.3±25.2 (<i>P</i> <0.925)
Mean LVEF	47.25±14.6	39.82±13.7	30.33±7.2 (<i>P</i> <0.096)
PAH	10	18	00 (<i>P</i> <0.0495)
Mean blood urea	43.33±7.4	43.26±21.6	45.67±7.8 (<i>P</i> <0.977)
Mean serum creatinine	1.01±0.22	1.08±0.27	1.23±0.11 (<i>P</i> <0.375)
Mean GFR	54.86±14.8	56.37±40.53	42.27±6.8 (<i>P</i> <0.802)

IHD: Ischemic heart disease, DM: Diabetes mellitus, COPD: Chronic obstructive pulmonary disease, HR: Heart rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, LVEF: Left ventricular ejection fraction, PAH: Pulmonary artery hypertension, GFR: Glomerular filtration rate

Table 2: LVEF among high normal and low normal sodium groups

Variable	Sodium categories	
	High normal (140-145 mmol/L) (n=14)	Low normal (135-139 mmol/L) (n=21)
Mean LVEF (%)	50±11.3	33±10.3 (<i>P</i> <0.019)

LVEF: Left ventricular ejection fraction

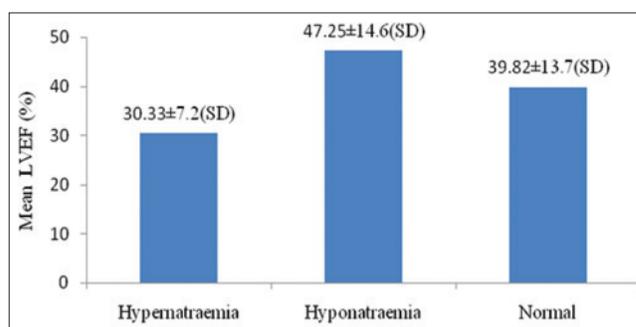
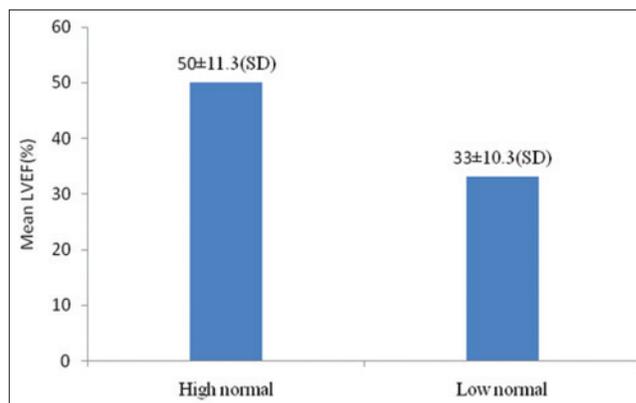
The mean LVEF was lower in patients with heart failure with hypernatremia (30.33% ± 7.2%) compared to those with hyponatremia (47.25% ± 14.6%) and those with normal sodium values (39.82% ± 13.7%) (Table 2 and Graph 1).

The mean LVEF was lower in patients with heart failure with low normal sodium values (33% ± 10.3%) compared to those with high normal sodium values (50% ± 11.3%) which was statistically significant (*P* < 0.019) (Graph 2).

PAH was present in 28 (56%) patients in the present study. PAH was present in 83.33% of patients with hyponatremia and 51.43% of patients with normal sodium values in the present study which was statistically significant (*P* < 0.0495) (Graph 3).

The mean blood urea was higher (45.67 ± 7.8 mg/dL) in patients with heart failure who had hypernatremia compared to those who had hyponatremia (43.33 ± 7.4 mg/dL) and those who had normal sodium values (43.26 ± 21.6 mg/dL).

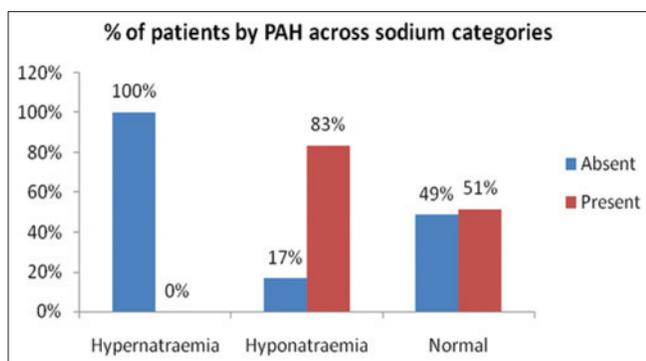
The mean serum creatinine was higher (1.23 ± 0.11 mg/dL) in patients with heart failure who had hypernatremia compared to those who had hyponatremia (1.01 ± 0.22 mg/dL) and those who had normal sodium values (1.08 ± 0.27 mg/dL). Mean GFR was lower (42.27 ± 6.8 ml/min) in patients with heart failure who had

**Graph 1: Left ventricular ejection fraction among different sodium groups****Graph 2: Left ventricular ejection fraction among high normal and low normal sodium groups**

hypernatremia compared to those who had hyponatremia (54.86 ± 14.8 ml/min) and those who had normal sodium values (56.37 ± 40.53 ml/min).

DISCUSSION

Heart failure patients with hyponatremia seem to exhibit a pathophysiological profile that is different from heart failure patients without hyponatremia, as it reflects a greater



Graph 3: Pulmonary artery hypertension among different sodium groups

activation of the rennin-angiotension aldosterone system, the arginine vasopressin system, and the sympathetic nervous system. Both hyponatremia and hypernatremia indicate a markedly compromised prognosis in heart failure regardless of LVEF.

The mean age of study population was 58.1 ± 13.6 years in our study. In Deubner *et al.* study, median age was 73 years.

The prevalence of dysnatraemia was 30% in our study; 24% had hyponatremia and 6% had hypernatremia.

Deubner *et al.* study had 17% prevalence of dysnatraemia, 7.2% hyponatremia, and 9.8% hypernatremia. The prevalence of hyponatremia is more in our study as all patients were in decompensated state with NYHA Class 4. The prevalence of hyponatremia increases to 20-30% when the patient is admitted with acute heart failure. The incidence of higher prevalence of hyponatremia would be attributable to the loop diuretics which patients were already on for heart failure prior to admission.

The studies which included patients with decompensated heart failure had a higher prevalence of hyponatremia. Outcomes of a Prospective Trial of Intravenous Milrinone for Exacerbations of Chronic Heart Failure (OPTIME-CHF) trial had 27% prevalence of hyponatremia. ESCAPE trial study had 24% prevalence of hyponatremia similar to our study. OPTIMIZE-HF registry had 26% prevalence of hyponatremia.

Studies on prevalence of hypernatremia are not done, except for Deubner *et al.* prevalence of hypernatremia in their study was more compared to our study; this is probably because in their study there were no exclusion criteria other than acute *de novo* heart failure. The increased prevalence of hypernatremia in their study was may be because of associated renal dysfunction.

The mean age of patients in hypernatremia group was more (68.3 ± 7.6 years) compared to that in normal

sodium group (58.4 ± 13.9 years) which was statistically not significant ($P < 0.11$), may be because of small study group. In Deubner *et al.* study median age of hypernatremia group was 76 years, and that of normal sodium group was 72 years. This suggests that prevalence of hypernatremia increases in elderly patients with heart failure due to age-related reduction in renal reserve.

Mean SBP was lower in patients with heart failure who had hypernatremia ($P < 0.808$). Mean DBP was lower in patients with heart failure who had hyponatremia ($P < 0.925$).

In the previous study of Balling *et al.*, hyponatremia was independently associated with lower SBP compared to patients with normal sodium values.²¹ However, in our study, we did not find such association, infact in our study hypernatremia was associated with lower SBP. This may be because of small sample size further studies are needed to find a casual relationship.

All patients with hypernatremia had decreased LVEF. In fact mean LVEF was more in hyponatremia group than with group with normal sodium range which was not statistically significant ($P < 0.096$) may be because of small sample size. This suggests that hyponatremia occurs irrespective of whether the systolic function normal or decreased, others factors might contribute to the pathogenesis of hyponatremia in patients with preserved LVEF.

The mean LVEF was lower in patients with heart failure with low normal sodium values ($33\% \pm 10.3\%$) compared to those with high normal sodium values ($50\% \pm 11.3\%$) which was statistically significant ($P < 0.019$). This shows that in patients with high normal sodium LVEF was preserved and was decreased in patients with low normal sodium group. In Deubner *et al.* study median, LVEF was 40% in low normal sodium group and 41% in high normal sodium group. In their study, the prognosis was better in patients with high normal sodium compared to those with low normal sodium.

PAH was present in 28 (56%) patients, out of which 10 (35.7%) had hyponatremia rest 18 had sodium in the normal range. PAH was present in 83.33% hyponatremia group compared to 51.43% in the group with sodium in the normal range, which was statistically significant ($P < 0.049$). Interestingly in a patient with hyponatremia and PAH, COPD/asthma was present in 8 patients (80.0%), and LVEF was preserved in 6 patients (60%). This indicates increased neurohormonal activation and thereby hyponatremia may occur in heart failure patients with associated PAH irrespective of systolic dysfunction severity compared to those without PAH. This also suggests that patient with heart failure with PAH are at more risk for hyponatremia. Increased sympathetic activation has recently been

demonstrated in PAH and is thought to correlate with disease severity and impact hemodynamics in a similar manner to left heart failure. In a study conducted by Campo *et al.*, in patients with PAH, hyponatremia was present in 45.2%. In their study, hyponatremia predicted poor prognosis in patients with PAH admitted for right heart failure.²²

In a previous study by Deubner *et al.*, hyponatremia was associated with higher blood urea and serum creatinine levels with lower GFR. In our study, hypernatremia was associated with higher blood urea and serum creatinine levels with lower GFR. This is probably because of small sample size and strict exclusion criterias in our study. The mean age of patients with hypernatremia was the more compared to patients with hyponatremia in our study, which might have lead to an age-related reduction in renal reserve.

CONCLUSION

Dysnatraemia is a common occurrence in patients with heart failure, with hyponatremia being common which needs to be recognized. The hypernatremia is commonly associated with lower LVEF, lower SBP, higher blood urea and higher serum creatinine, and lower GFR. The hyponatremia is commonly associated with PAH and lower DBP. LVEF is preserved in patients with high normal sodium levels.

The sample size in our study was small compared to previous studies hence we couldn't get significant *P* values. Further large studies are required to confirm these associations.

The study was restricted to cross-sectional study due to logistical issues; hence the prognostic importance of dysnatraemia in heart failure patients could not be assessed.

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Comparative Evaluation between the Effects of Low-Intensity Laser Therapy and Transcutaneous Electric Nerve Stimulation on Temporomandibular Joint Disorders

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Abstract

Background: Temporomandibular disorders (TMD) are characterized by the presence of temporomandibular joint (TMJ) and/or masticatory muscle pain and dysfunction. Trans-cutaneous electric nerve stimulation (TENS) and low-level laser therapy (LLLT) have been recognized as therapeutic modalities for the treatment of TMD, especially when the presence of inflammatory pain is suspected. This study aims to compare the efficacy of the two treatment modalities in various TMJ disorders.

Objective: The aim of this study was to evaluate the efficacy of low intensity or LLLT and TENS in the treatment of patients with TMD.

Materials and Methods: A sample of 30 individuals, divided into two groups presenting signs and symptoms of TMD (I - LLLT and II - TENS) was taken. Both therapies were done in a total of 14 sessions. Therapy was performed for 5 days within the 1st week and then on the 30th day and the 60th day. The visual analogue scale was used to evaluate pain, digital vernier calliper used to evaluate mouth opening. Deviation from normal motion and clicking were also noted on opening and closing. The analysis of variance for repeated measurements and Tukey's tests were used for the statistical analysis.

Results: The results showed an increase in maximum mouth opening and a decrease in tenderness to palpation for both groups. Results also showed a decrease in clicking sound and deviation in both groups, although more evident for the low-level laser group.

Conclusion: Authors concluded that both therapies were effective as part of the TMD treatment though lasers proved better. However, caution is recommended when judging the results due to the self-limiting aspect of musculoskeletal conditions such as TMD.

Key words: Clicking, Dysfunction, Low-level laser therapy, Mouth opening, Temporomandibular joint disorders, Tenderness, Transcutaneous electric nerve stimulation

INTRODUCTION

Temporomandibular disorders (TMD) consist of a number of clinical conditions that involve the masticatory

musculature and/or temporomandibular joints (TMJ) and associated structures. Failure of any one component of these structures may impair the function of the entire system as a whole. Although the etiology of TMD is not well established, it is known that somatic or psychosocial factors may cause or maintain the disease. It is diagnosed in patients who suffer from muscle and/or joint pain spontaneously, by palpation or function and limited mandibular movements. Joint sounds are another symptom of TMD. Although pain around the myofascial region may be constant or intermittent, it is usually long-lasting and restricting. Non-surgical treatments of TMD generally consist of

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medications (such as non-steroidal anti-inflammatory drugs and antidepressants), consuming soft foods, treatment of parafunctional activities, occlusal splints, physical therapy such as ultrasound and transcutaneous electrical neural stimulation (TENS) alternative therapies.¹

TMD is considered the most common cause of pain of non-dental origin in the orofacial region and contains a varied group of disorders with common symptoms of psychophysiological orofacial pain, masticatory dysfunction, or both. Signs and symptoms of this dysfunction are present in approximately 86% of the population, most frequent in women in the 30 years old age group.²

Dysfunctions in the masticatory muscles are considered the main originating cause of non-dental pain in the orofacial region. The pain described as facial pain, headache, or earache is commonly intensified by mandibular function. TMDs are also accompanied by recurring headaches and pain in the neck, showing a high incidence of signs and symptoms such as muscle spasms, reflex pain, difficulty in joint movement, crepitation, headache, and hearing disorders. The physical therapy approach and appropriate treatment plans for TMD must necessarily be based on the diagnosis. Laser photobiomodulation is a low-cost non-invasive type of treatment that can be used for controlling a variety of such conditions. It is frequently used in clinical practice for pain relief and tissue regeneration and has been certified as beneficial in treating temporomandibular dysfunctions. Among the therapeutic effects are anti-inflammatory, analgesic and cell activity modulating actions, which have been proven in various studies. The mode of action of laser photobiomodulation is by activating the components of the mitochondrial respiratory chain, resulting in the start of a series of cellular events. Once absorbed by the tissues, the laser radiation causes the release of histamine, serotonin, bradykinin, and prostaglandins that are related to pain. It is also capable of modifying cell and enzymatic activities.³

The use of low-level laser therapy (LLLT) has gained popularity in recent years as a method of management of many localized, painful, musculoskeletal conditions. Although phototherapy devices have been in use for LLLT treatment since the mid-1960s, their therapeutic value remains controversial as the literature has conflicting results. In the past few years, a number of clinical trials and analyses have shown that LLLT effectively treats different musculoskeletal and neurogenic pain pathologies. However, limited information still exists about the effects of LLLT in such conditions.¹

TENS is used to relax hyperactive muscles. It acts like a neuromuscular stimulator. TENS therapy produces a

low-amplitude, a low-frequency alternating stimulus that causes muscles to contract and relax. Applied bilaterally between the TMJ and the coronoid process, the stimulus reaches the deep mandibular division of the trigeminal nerve, as well as the superficial facial nerve. TENS therapy is applied to reduce the muscular activity of masticatory muscles.

LLLT is in accordance with TMD's treatment philosophy because it represents a non-invasive, reversible therapy without any side effects. LLLT makes use of electromagnetic radiation of a single wavelength, usually in the red or infrared regions. LLLT also helps provide treatment for several pathologies like impaired wound healing, pain conditions, and inflammatory situations.⁴

Aim

The aim of this study was to evaluate the efficacy of low-intensity laser therapy (LLLT) and compare it with TENS in patients suffering from TMJ pain and dysfunction.

Objectives

1. To evaluate and compare the effect of LLLT and TENS therapy on restricted mouth opening
2. To evaluate and compare the relief in TMJ pain after LLLT and TENS therapy
3. To evaluate and compare the relief in reciprocal joint clicking after LLLT and TENS therapy
4. To evaluate and compare the relief in muscle tenderness after LLLT and TENS therapy
5. To evaluate and compare the effect of LLLT and TENS therapy on the deviation.

MATERIALS AND METHODS

This study involved 30 patients that came to the Department of Prosthodontics and the Department of Oral Medicine and Radiology, Sardar Patel Post Graduate Institute of Dental and Medical Sciences with diagnoses of TMD of multiple causes. Informed consent for participation in this study was obtained in all cases. Following a preliminary evaluation to exclude patients with presence of systemic diseases and those with history of recent trauma, the inclusion criteria comprised of patients with presence of pain, reciprocal joint clicking, restricted mouth opening and jaw deviation and not having medical or pharmacological treatment for TMD. Patients presented multiple causes of TMD. During the study, patients were instructed not to take systemic medication for TMD. Prior to the therapies, the patients were made to sit in a dental chair in an upright position with their heads resting on the head rest. Patients were instructed to open their mouth until it reached maximum capability without excessive discomfort. Clicking sound was noted on opening and closing of the mouth.

Pain was evaluated using the visual analogue scale (VAS). With a digital vernier calliper, the total mouth opening was recorded, with the measure being performed from the incisal of the upper incisors to the incisal of the lower incisors. All patients received both methods randomly alternated, in one treatment session per day for 5 days, followed by recall on the 30th and 60th day. LLLT was performed with a continuous-wave diode laser (Lambda SPA - Italy), emission wavelength of 980 nm, output power of 1 W for 60 s. Four sites were chosen to receive the irradiation: The area over the masseter muscle, the temporal muscle, the condyle, and pre-tragal region. The treatment was performed bilaterally with total time duration of 10 min. TENS therapy was executed with a two-electrode machine (model XFT 320-A; Shenzhen XFT Electronics Co. Ltd. China), output frequency 1-100 Hz. The patients were instructed to adjust the intensity of the equipment according to their sensitivity so that the treatment would not be uncomfortable; the equipment has seven different intensities. The total duration of the treatment was 10 min. Each electrode was placed in one side, so the treatment was performed bilaterally. The position of the electrode was between the TMJ and the coronoid process, to allow the arrival of the stimulus to the trigeminal nerve as well as the facial nerve. The results were compared for each individual treatment (before and after treatment values), as well as between treatments (mean of the after treatment improvement) [Figures 1 and 2].

Statistical Analysis

Data were summarized as mean ± standard deviation (SD). Groups were compared by two factors (groups × periods) repeated measures analysis of variance (ANOVA) and the significance of mean difference within and between the groups was done by Tukey’s *post-hoc* test. Categorical groups were compared by Chi-square (χ^2) test. A two-sided ($\alpha = 2$)

$P < 0.05$ was considered statistically significant. All analyses were performed on SPSS software.

RESULTS

Basic Characteristics

The basic characteristics *viz.*, age and sex distribution of two groups (TENS therapy and LASER therapy) are summarized in Table 1. The age of TENS and LASER groups ranged from 22-66 to 26-52 years, respectively with mean (\pm SD) 45.20 \pm 12.70 years and 40.07 \pm 7.30 years, respectively. The mean age of TENS group was slightly higher than LASER group but not differed statistically ($t = 1.36, P = 0.186$). Further, in both groups, the frequency (%) of males was higher than females with slightly higher being in TENS (66.7%) as compared to LASER (60.0%); however, the sex proportion (female/male) also not differed ($P > 0.05$) between the two groups ($\chi^2 = 0.14, P = 0.705$), i.e. found to be statistically the same. In other words, subjects of two groups were age and sex matched and comparable.

Primary Outcome Measures

Maximum mouth opening

The pre (day 0) and post (day 1-60) maximum mouth opening of two groups are summarized in Table 2 and also shown in Graph 1. Table 2 and Graph 1 both showed that the mean maximum mouth opening in both groups increase (improve) after the treatments and the increase

Table 1: Basic characteristics of two groups

Basic characteristics	TENS therapy n=15 (%)	LASER therapy n=15 (%)	t/ χ^2 value	P value
Age (years)	45.20±12.70	40.07±7.30	1.36	0.186
Sex				
Females	5 (33.3)	6 (40.0)	0.14	0.705
Males	10 (66.7)	9 (60.0)		

TENS: Trans-cutaneous electric nerve stimulation



Figure 1: Providing trans-cutaneous electric nerve stimulation to patient

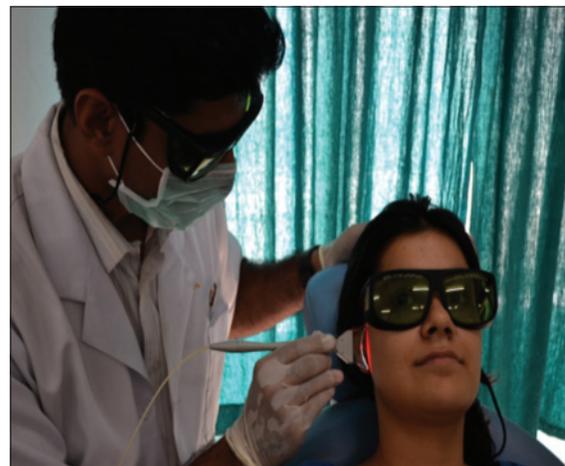


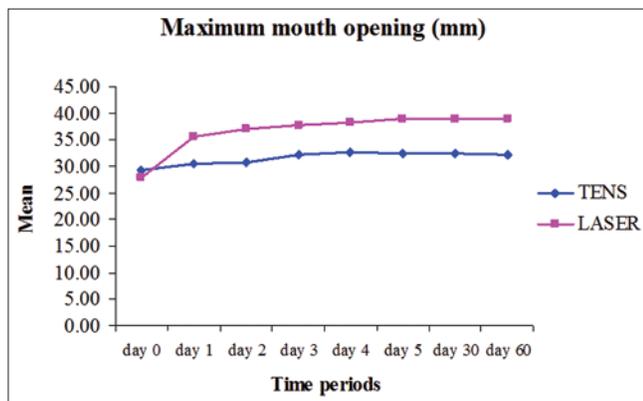
Figure 2: Providing low intensity laser therapy to patient

(improvement) was evident higher in LASER group as compared to TENS group.

Comparing the mean maximum mouth opening of two groups over the periods, ANOVA revealed significant effect of both groups (treatments) ($F = 18.81, P < 0.001$) and period (time) ($F = 65.36, P < 0.001$) on maximum mouth opening. Further, the interaction (groups \times periods) effect of both on maximum mouth opening was also found to be significant ($F = 19.89, P < 0.001$).

Further, for each group, comparing the mean maximum mouth opening between the periods (i.e. within groups), Tukey test revealed significant ($P < 0.01$ or $P < 0.001$) improvement in maximum mouth opening of both the groups over the periods.

Similarly, for each period, comparing the mean maximum mouth opening between the groups, Tukey test revealed significantly ($P < 0.05$ or $P < 0.01$) different and higher improvement in maximum mouth opening of LASER group as compared to TENS group at all post periods (day 1-60). Moreover, at final evaluation, the net improvement (i.e. mean change from day 0 to 60) in maximum mouth opening of LASER group (28.3%) was 3.2-fold (or 19.4%) higher as compared to TENS group (8.9%) [Graph 2].



Graph 1: Pre- and post-treatments maximum mouth opening of two groups over the periods

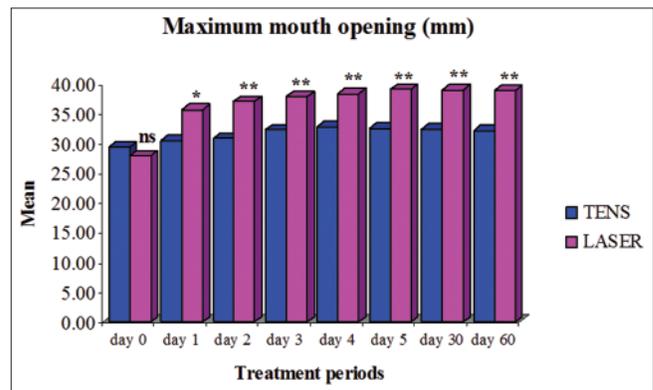
VAS

The pre (day 0) and post (day 1-60) VAS scores of two groups are summarized in Table 3 and also depicted in Graph 3. Table 3 and Graph 3 both showed that the mean VAS scores in both groups decrease (improve) after the treatments, and the decrease (improvement) was evident higher in LASER group as compared to TENS group.

Comparing the mean VAS scores of two groups over the periods, ANOVA revealed significant effect of both groups (treatments) ($F = 57.46, P < 0.001$) and period (time) ($F = 99.24, P < 0.001$) on VAS scores. Further, the interaction (groups \times periods) effect of both on VAS scores was also found to be significant ($F = 16.79, P < 0.001$).

Further, for each group, comparing the mean VAS scores between the periods (i.e. within groups), Tukey test revealed significant ($P < 0.05$ or $P < 0.01$ or $P < 0.001$) improvement in VAS scores of both the groups over the periods.

Similarly, for each period, comparing the mean VAS scores between the groups, Tukey test revealed significantly ($P < 0.05$ or $P < 0.01$ or $P < 0.001$) different and higher improvement in VAS scores of LASER group as compared to TENS group at all post periods (day 1-60). Moreover, at final evaluation,



Graph 2: For each period, mean maximum mouth opening between the two groups. ^{ns} $P > 0.05$ or ^{*} $P < 0.05$ or ^{**} $P < 0.010$ - As compared to trans-cutaneous electric nerve stimulation

Table 2: Pre- and post-treatments maximum mouth opening (mean \pm SD) of two groups

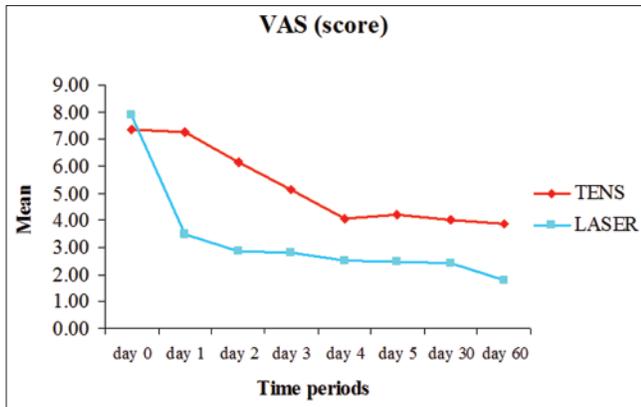
Groups	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 30	Day 60	% change (day 0-60)
TENS therapy	29.27 \pm 3.95	30.47 \pm 4.36	30.73 \pm 3.81	32.20 \pm 4.09	32.73 \pm 3.97	32.53 \pm 3.50	32.33 \pm 3.60	32.13 \pm 3.52	8.9
LASER therapy	27.87 \pm 4.61	35.60 \pm 4.45	36.93 \pm 3.56	37.73 \pm 3.31	38.27 \pm 2.81	39.07 \pm 2.12	38.93 \pm 2.12	38.87 \pm 2.00	28.3

TENS: Trans-cutaneous electric nerve stimulation, SD: Standard deviation

Table 3: Pre- and post-treatments VAS scores (mean \pm SD) of two groups

Groups	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 30	Day 60	% change (day 0-60)
TENS therapy	7.33 \pm 0.90	7.27 \pm 0.88	6.13 \pm 0.74	5.13 \pm 1.55	4.07 \pm 2.22	4.20 \pm 1.21	4.00 \pm 1.13	3.87 \pm 1.41	47.3
LASER therapy	7.87 \pm 0.99	3.47 \pm 0.92	2.87 \pm 0.52	2.80 \pm 0.56	2.53 \pm 0.92	2.47 \pm 0.83	2.40 \pm 0.51	1.80 \pm 0.56	77.1

TENS: Trans-cutaneous electric nerve stimulation, SD: Standard deviation, VAS: Visual analogue scale



Graph 3: Pre- and post-treatments visual analogue scale scores of two groups over the periods

the net improvement (i.e. mean change from day 0 to 60) in VAS score of LASER group (77.1%) was 1.6-fold (or 29.8%) higher as compared to TENS group (47.3%) [Graph 4].

Secondary Outcome Measures

TMJ sound

The pre (day 0) and post (day 60) TMJ sound presence of two groups are summarized in Table 4. At day 0, the presence of TMJ sound was higher in LASER group (66.7%) than TENS group (53.3%); however, at day 60 (final evaluation) it was lower in LASER group (6.75) as compared to TENS group (26.7%). Comparing the presence of TMJ sound of two groups at two different periods, χ^2 test revealed similar TMJ sound between the two groups ($\chi^2 = 1.98, P = 0.159$), i.e. not differed statistically.

Muscle tenderness

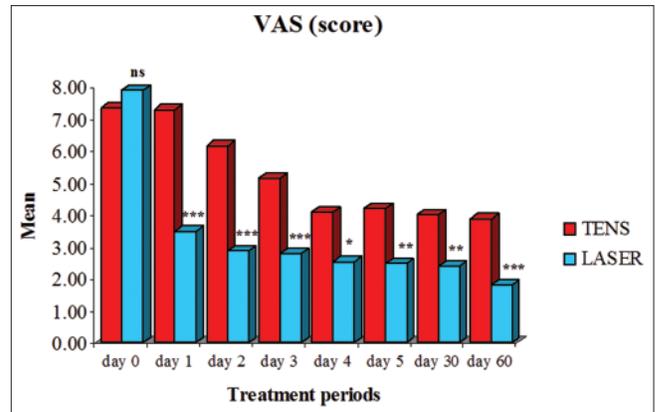
The pre (day 0) and post (day 60) presence of muscle tenderness of two groups are summarized in Table 5. At day 0, the muscle tenders was present 100.0% in both groups; however, at final evaluation, it decrease (60.0%) significantly in LASER group as compared to TENS group ($\chi^2 = 5.66, P = 0.017$).

Deviation

The pre (day 0) and post (day 60) presence of deviation of two groups are summarized in Table 6. At day 0, both groups showed similar deviation (60.0%); however, not differed also after 60 days post-treatments ($\chi^2 = 1.15, P = 0.284$) though it lowered 33.3% more in LASER group as compared to TENS group.

DISCUSSION

In the present study, many criteria were considered for judgment of treatment effectiveness including range of mouth opening, pain scales and ratings of muscle tenderness and clicking sounds.



Graph 4: For each period, mean visual analogue scale score between the two groups. ^{ns} $P > 0.05$ or ^{*} $P < 0.05$ or ^{**} $P < 0.010$ or ^{***} $P < 0.001$ - as compared to trans-cutaneous electric nerve stimulation

Table 4: Pre (day 0) and post (day 60) distribution of TMJ sound presence of two groups

TMJ sound (present)	TENS therapy n=15 (%)	LASER therapy (n=15) (%)	χ^2 value (df=1)	P value
Day 0	8 (53.3)	10 (66.7)	1.98	0.159
Day 60	4 (26.7)	1 (6.7)		

TMJ: Temporomandibular joint, TENS: Trans-cutaneous electric nerve stimulation

Table 5: Pre (day 0) and post (day 60) distribution of muscle tenderness presence of two groups

Muscle tenderness (present)	TENS therapy n=15 (%)	LASER therapy n=15 (%)	χ^2 value (df=1)	P value
Day 0	15 (100.0)	15 (100.0)	5.66	0.017
Day 60	10 (66.7)	1 (6.7)		

TENS: Trans-cutaneous electric nerve stimulation

Table 6: Pre (day 0) and post (day 60) distribution of deviation presence of two groups

Deviation (present)	TENS therapy n=15 (%)	LASER therapy n=15 (%)	χ^2 value (df=1)	P value
Day 0	9 (60.0)	9 (60.0)	1.15	0.284
Day 60	9 (60.0)	4 (26.7)		

TENS: Trans-cutaneous electric nerve stimulation

Similar to results shown in our study, many studies have shown the effectiveness of TENS in the management of TMD, individually as well as combined with other therapies and are known to improve the stomatognathic system functionally.⁵ Grossmann *et al.*, 2012 presented a review article on the effectiveness of TENS for TMD and concluded that TENS is a treatment alternative for pain as well as TMD.⁶

Monaco *et al.*, 2012 performed studies on 60 patients to evaluate the effect of TENS on electromyographic

and kinesiographic activity of patient with TMD. They concluded that TENS could be effective to reduce the surface electromyography activity in masticatory muscles and improve interocclusal distance of TMD patients.⁷

Several reports have documented the positive effects of TENS and LLLT in TMD. In our study, LLLT has shown to have eliminated signs and symptoms of TMD more than TENS therapy has. Similar results were seen by Kato *et al.*, in 2006 who performed a comparative study on 18 patients with chronic TMD using TENS and LLLT and concluded that both therapies were effective for decreasing the symptoms of TMD.⁸

Núñez *et al.*, in 2006 performed a comparative study on 10 patients, 18-56 years of age with TMD, using TENS and LLLT and noted the range of mouth opening in the patients. The patients received both methods of treatment in 2 consecutive weeks. Comparing the two methods, the values obtained after LLLT were significantly higher than those obtained after TENS ($P < 0.01$). This concluded that even though both methods are effective to improve mouth opening, by comparing the two methods LLLT was more effective than TENS.⁴

A systematic review was done by Maia *et al.*, in 2012 on the effect of LLLT on pain levels in patients with TMD. 14 studies were reviewed and a reduction in pain levels was reported in 13 studies. Most papers showed that LLLT seemed to be effective in reducing pain from TMD similar to the results shown in our study. However, the heterogeneity of the standardization regarding the parameters of laser calls for caution in interpretation of these results.²

Another meta-analysis study by Enwemeka *et al.*, in 2004 on the efficacy of low-power lasers in tissue repair and pain control revealed a positive effect of laser phototherapy on tissue repair and pain control. The positive effect of treatment on specific indices of tissue repair was evident in the treatment effect sizes determined as follows: Collagen formation ($d = +2.78$), rate of healing ($d = +1.57$), tensile strength ($d = +2.13$), time needed for wound closure ($d = +0.76$), tensile stress ($d = +2.65$), number and rate of degranulation of mast cells ($d = +1.87$), and flap survival ($d = +1.95$). Further, analysis revealed the positive effects of various wavelengths of laser light on tissue repair, with 632.8 nm having the highest treatment effect ($d = +2.44$) and 780 nm the least ($d = 0.60$). The overall treatment effect for pain control was positive as well ($d = +1.11$). These findings mandate the conclusion that laser phototherapy is a highly effective therapeutic armamentarium for tissue repair and pain relief.⁹

In another study in 2009 by Carrasco *et al.*, 60 patients with myofascial pain syndrome and having one active trigger point in the anterior masseter and anterior temporal muscles were selected and assigned randomly to six groups ($n = 10$): Groups I-III were treated with gallium aluminum arsenide (780 nm) laser, applied in continuous mode and in a meticulous way, twice a week, for 4 weeks. Groups IV-VI were treated with placebo applications, simulating the same parameters as the treated groups. Pain scores were assessed just before, then immediately after the fourth application, immediately after the eighth application, at 15 days and 1 month following treatment. A significant pain reduction was observed over time ($P < 0.001$). The analgesic effect of the LLLT was similar to the placebo groups. Using the parameters described in this experiment, LLLT was effective in reducing pain experienced by patients with myofascial pain syndrome.¹⁰

Another meta-analysis of the efficacy of phototherapy in tissue repair by Fulop *et al.*, was done by aggregating the literature and using statistical meta-analysis to analyze pertinent studies published between 2000 and 2007. Their findings indicated that phototherapy is a highly effective form of treatment for tissue repair, with stronger supporting evidence resulting from experimental animal studies than human studies.¹¹

CONCLUSION

1. Both therapies (LLLT and TENS) were effective in the management of TMDs
2. Range of mouth opening, tenderness (temporomandibular as well as muscular), clicking sound as well as deviation from normal motion have improved for both groups, but LLLT was notably more effective than TENS therapy
3. More longitudinal and controlled studies must be performed to evaluate the real effect of physical therapy modalities on TMD signs and symptoms.

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Maternal Near Miss Death among Women with Eclampsia in Tertiary Care Center

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Abstract

Introduction: Since long maternal mortality (MM) has been considered as an indicator of maternal health. Review of the cases with near miss (NM) obstetric events has come up as a new tool to investigate MM.

Objectives: To determine the prevalence of NM cases and to analyze the nature of these cases and MM in patients with eclampsia.

Materials and Methods: This study was a retrospective study done for 12 months between January and December 2014. This study was conducted in the Department of Obstetrics and Gynecology, Indira Gandhi Government Medical College, Nagpur, which is a tertiary care center and serves as a referral center for other hospitals. Geller's five-factor scoring system is used to identify NM cases among patients with eclampsia. The cut-off point for NM case is a score of 8 or greater.

Results: During the study period, 50 women were identified as eclamptic and among these 26 were identified as NM cases. The prevalence of NM obstetric case in this study was 52%. It is observed that rates are higher in areas with poor resources and whenever the organ-system based criteria are used. Among the patients who are categorized as NM, anemia was seen in 10 (38.46%) and high level of uric acid was seen in 16 (61.53%) patients, which were both statistically significant. Neonatal distress was seen in 9 (34.61%) cases, thus signifying that proper antenatal care and timely correction of anemia could have led to improvement in their health, putting these patients life at less risk.

Conclusion: The review of NM cases is helpful in improving maternal health and types of support services commonly required, as it is considered as a good guide to the standard of maternal care.

Key words: Eclampsia, Morbidity, Maternal mortality, Organ dysfunction

INTRODUCTION

Maternal mortality (MM) is frequently described as "Just the Tip of the Iceberg" alluding that there is a vast base to the iceberg in the form of maternal near miss (MNM), i.e. maternal morbidity which has remained largely undescribed.¹ In 2009, Röst *et al.* reported MM ratio (MMR) as 187/100,000 live births (LB) and MNM as 50/1000 LB, with a relatively low mortality index (MI) of 3.6%.²

In 2009, the WHO defined MNM – "A woman who nearly died but survived a complication that occurred during, pregnancy, child birth, or within 42 days of termination of pregnancy."³ WHO standardized, identification of organ dysfunction and /or failure as main determinant of severity to identify MNM cases, after the identification of organ dysfunction and/or failure as the main determinants of severity. Clinical signs, laboratory tests, and management interventions were used, all capable of diagnosing organ dysfunction or failure.³ These criteria were previously validated by the WHO Working Group following markers of dysfunction and total maximum sequential organ failure assessment score, applied to an obstetric population.³⁻⁵

It has been estimated that hypertensive disorders (HD) in pregnancy cause 50,000 maternal deaths (MD) annually in the world and the vast majority of them occur in low-income or middle-income countries.⁶

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HD increase the risk of severe complications by 3-25 times, e.g. placental abruption, thrombocytopenia, disseminated intravascular coagulation, acute pulmonary edema, cerebrovascular disorders, and other conditions, in comparison to women without hypertension.⁷⁻⁹ The contrast between low or very low MMR in high-income countries, compared to low-income or middle-income countries with high MMR has been attributed to the quality of obstetric care, patient access to hospitalization, qualification of health professionals, and structural resources, including the input and availability of intensive care units.¹⁰⁻¹²

India has made significant progress in reducing its MM rate from 254 (SRS 2004-06) to 212 (SRS 2007-09) to 178 (SRS 2010-12) per 100,000 LB;¹³ however, there is a long way to go on this journey to meet the millennium development goals.

This study is proposed due to the high association between HDs in pregnancy and severe obstetric or clinical complications. In addition, there are only few studies to date focused on severe morbidity as proposed by the WHO.³ Therefore, the purpose of the current study was to identify the prevalence and factors associated with the risk of severe maternal outcomes (NM and MD) in a female population with eclampsia.

Objectives

- To determine the prevalence of NM cases in patients with eclampsia
- To analyze the nature of NM obstetric cases and MM in patients with eclampsia.

MATERIALS AND METHODS

Place of Study

The study was conducted in the Department of Obstetrics and Gynecology, Indira Gandhi Government Medical College, Nagpur, which is a tertiary care center of central India and serves as a referral center for other hospitals.

Definition of Cases

NM events are defined as acute obstetric complications that immediately threatens a woman's survival but do not result in her death either by chance or because of hospital care she receives during pregnancy, labor or within 6 weeks after termination of pregnancy or delivery.¹⁴

For identifying NM cases five-factors scoring system was used.¹⁵ The five-factor scoring system has the specificity of 93.9%. It comprises of organ-system failure, intensive care unit admission, transfusion >3 units, extended intubation (>12 h), and surgical intervention (hysterectomy,

relaparotomy). These factors are given the score of 5, 4, 3, 2, and 1, respectively. A five-factor scoring system can theoretically have a score from 0 to 15 (no clinical factor present to all clinical factors present). The cut-off point for NM case is a score of 8 or greater.

Study Design and Identification of Cases

This was a retrospective study done for a period of 12 months between January 1, 2014 and December 31, 2014.

For this specific analysis focusing on eclampsia, we included women diagnosed with: Severe preeclampsia (blood pressure $\geq 160/110$ mmHg and/or symptomatology of target organ compromise and/or proteinuria determined by dipstick 2+ or over 24 h ≥ 2 g; and/or oliguria < 30 ml/h and/or thrombocytopenia $< 100,000$ mm³) with presence of seizures.

Five-factor scoring system was used to identify the NM cases.

For each case of NM, variables studied were age, parity, obstetric history, history of the previous hypertensive disease, family history, mode of delivery, perinatal results, and clinical complications.

Information on MDs related to eclampsia and deliveries conducted during the study period were obtained from MM audit and the labor or delivery registers. For each case of MD, data were collected on the demographic characteristics including gestational age at the time of death and the underlying cause of death.

Data Analysis

Data were entered into a computer database using Microsoft Excel spreadsheet and statistical analysis was performed. Results are presented as frequencies, percentages, and descriptive statistics.

The frequencies of NM events are reported according to the clinical condition responsible, referral status of the patients and whether the complications were present on arrival or occurred while on admission at the hospital. MM ratio was calculated as the number of MDs per 100,000 LBs.

RESULTS

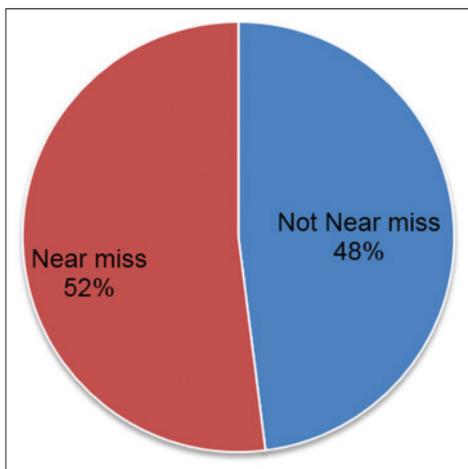
As shown in Figure 1, total 50 patients were enrolled in the study, where 26 patients were categorized as NM, and 24 were categorized as not NM.

As shown in the Table 1, on further stratifying between the groups, mean age of the patients in Group A was 23.98

Table 1: Age characteristics

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Age group in years	Mean (year)±SD	23.98±3.65	24.98±2.91	0.06	NS
	≤19	3	0	-	-
	20-34	21	24		
	>35	0	2		

NM: Near miss

**Figure 1: Prevalence of Anemia**

with standard deviation (SD) of 3.6 while in Group B mean age was 24.88 with SD of 2.9 hence, it was found that all patients had almost similar characteristics with regard to age in both groups, i.e. patients with NM death and in those with not NM death.

As shown in the Table 2, while analyzing gravidity, NM death was seen to be more common in primigravida. However, the occurrence of NM death was not statistically significant between multigravida and primigravida. Thus, suggesting that increase in gravidity is not an isolated risk factor for the occurrence of NM death.

As shown in Table 3, most of the deliveries were at term period of gestation in both group A and in group B and in control, thus *P* value at 0.191 was found to be insignificant.

As shown in the Table 4, the presence of hypertension in previous pregnancies was not found in any of the multigravida in both Group A and Group B.

As shown in the Table 5, the presence of family history between the NM cases and not NM cases was not found to be statistically significant with *P* value of 0.480.

As shown in the Table 6, among patients in Group B, 10 patients had anemia (38.46%) which was found to be statistically significant with *P* value of 0.004, using cut-off for anemia as 11 g% in third trimester, as defined by WHO.

Table 2: Gravidity

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Gravidity	Primigravida	15	18	0.308	NS
	Multigravida	9	8		

NM: Near miss

Table 3: POG

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
POG at delivery	Pre-term	4	7	0.191	NS
	Term	20	19		
	Postdate	0	0		

POG: Period of gestation, NM: Near miss

Table 4: Past history of hypertension

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Past history	Present	2	3	0.462	NS
	Absent	22	23		

NM: Near miss

Table 5: Family history

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Family history	Present	1	0	0.480	NS
	Absent	23	26		

NM: Near miss

Three patients in Group B had thrombocytopenia with platelets <100,000 which was statistically not significant with *P* value of 0.133.

Uric acid was high in 16 patients (61.53%), which was found to be statistically significant with *P* value of 0.00003.

Creatinine was raised in 7 patients which was statistically insignificant with *P* value of 0.33.

Additionally, among other laboratory investigations such as prothrombin time or international normalized ratio, bleeding time, and clotting time no statistically significant association was found with NM death.

Table 6: Laboratory investigations

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Hemoglobin	Anemia present	19	10	0.004	Significant
	Anemia absent	5	16		
Platelets	Normal	24	23	0.133	NS
	Thrombocytopenia	0	3		
PT/INR	Normal	24	26	-	NS
	Abnormal	0	0		
Bleeding time	Normal	24	26	-	NS
	Abnormal	0	0		
Clotting time	Normal	24	26	-	NS
	Abnormal	0	0		
Uric acid	Normal	23	10	0.00003	Significant
	Abnormal	1	16		
Creatinine	Normal	24	19	0.33	NS
	Abnormal	0	7		

PT: Prothrombin time, INR: International normalized ratio, NM: Near miss

Table 7: Management

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Induction of labor	Done	12	11	0.293	NS
	Not done	12	15		

NM: Near miss

As shown in the Table 7, in the management of the patients, the presence of induction of labor (42.30%) was not statistically significant in patients with NM death.

As shown in the Table 8, meconium staining of amniotic fluid was seen in 4 (15.38%) cases in Group B which was found to be statistically not significant with *P* value of 0.189.

In the study, the rate of cesarean section in Group B (*n* = 26) was 38.4% while 57.7% patients had spontaneous vaginal delivery and 3.9% patients had Instrumental delivery. No statistical significance was seen between the two groups when comparing the mode of delivery.

As shown in the Table 9, in the study, neonatal distress after delivery was seen in 9 (34.61%) cases in Group B which was found to be statistically significant with *P* value of 0.037.

As shown in the Table 10 post-partum hemorrhage (PPH) was observed in 1 case (2%) in Group A, with no cases in Group B.

DISCUSSION

In this study, the prevalence of MNM among eclamptic patients was found to be 52%. The mean age among NM was seen to be 24 years.

The result of present study is in accordance with the study done by Zanette *et al.*¹⁶ where there were 82,144 LBs in the 27 maternity hospitals participating in the study and 9555 women received a diagnosis of severe maternal morbidity. Severe HDs were associated with 70% of these hospital admissions (6706/9555), corresponding to 81.6 cases per 1000 deliveries. Among the total number of women with severe HDs, 94% were classified as potentially life-threatening condition (6315/6706), while 349 cases had organ dysfunction or failure, with prevalence of 4.2 NM cases per 1000 LBs, a MI of 10.7% (42 MD per 391 cases of NM plus MD), and the MNM to MD ratio was 8.3 NM cases to 1 MD. The mortality was almost half of that for non-HD conditions.

In another study done in Kathmandu valley by Rana *et al.* (2013),¹⁷ out of 157 cases identified with NM rate of 3.8 per 1000 LBs, severe complications were PPH 62 (40%) and preeclampsia-eclampsia 25 (17%).

As per study another a cross-sectional observational study done by Kalra and Kachhwaha (2014)¹⁸ there were 27,958 deliveries and 26,734 LBs. Totally 112 patients were identified as NM as per Geller's five-point scoring system while there were 54 MDs, NM rate was 4.18/1000 LBs. As far as NM obstetric morbidity was concerned the most common complication was hemorrhage accounting for 56% cases. The second leading cause was hypertension in the form of eclampsia and preeclampsia accounting for 20 (17.8%) of total NM cases.

The prevalence of NM case was 2.3% in the study done by Shrestha *et al.*¹⁹ HD of the pregnancy accounted for 27.8% of the NM cases in this study.

This wide variation in range was seen due to the difference in the criteria used for the identification of the NM cases

Table 8: Maternal outcome

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Meconium staining of amniotic fluid	Yes	1	4	0.189	NS
	No	23	22		
Mode of delivery	Cesarean section	6	10	0.204	NS
	Spontaneous vaginal delivery	18	15		
	Instrumental delivery	0	1		

NM: Near miss

Table 9: Fetal outcomes

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
Neonatal distress after delivery	Yes	4	9	0.037	Significant
	No	22	15		

NM: Near miss

Table 10: Post-delivery complications

Characteristics	Categories	Group A	Group B	P value	Remarks
		Not NM	NM		
PPH	Yes	1	0	0.411	NS
	No	23	26		

PPH: Post-partum hemorrhage

and the place of study. Rates were higher in resource-poor setting area and whenever the organ-system based criteria was used.¹⁸

Among the eclamptic patients who were categorized as NM, anemia was seen to be statistically significant among these patients thus signifying that proper antenatal care and correction of anemia could have lead to improvement in their health putting these patients life at less risk.

In the study patients of eclampsia who were categorized as NM were seen to have high levels of uric acid, which was statistically significant.

Fetal distress was also found to be statistically significant in patients categorized as NM (9/26 patients). Thus, signifying that fetal life was also in jeopardy along with mother's. So, proper care of the mother is the key to reducing neonatal morbidity and mortality.

CONCLUSION

The review of NM cases, especially in patients with eclampsia, helps delineate continuing threats to maternal health and types of support services the most common required. The NM can be used as a guide to the standard of maternal care, as NM analysis indicated the quality of healthcare. The major causes of NM cases were similar to

the causes of MM. Lessons can be learned from cases of NM which can serve as a useful tool in reducing MM ratio. Need for development of an effective audit system for maternal care which includes both NM obstetric morbidity and mortality is felt.¹⁹

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Percutaneous Treatment of Hepatic Hydatid Cysts using Betadine and Hypertonic Saline

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Abstract

Introduction: Hydatid disease of the liver is an endemic disease in the rural areas of the cattle rearing countries of the world like India. Many treatment options are available for the same including surgery and medical therapy. The introduction of modified puncture aspiration, injection of scolicalid agent, and reaspiration (PAIR) under sonographic guidance in recent years has provided a new treatment option.

Purpose: The purpose of this study was to evaluate the efficacy of percutaneous treatment of hepatic hydatid cysts under sonographic guidance using betadine (10% povidone iodine + 1% free iodine) and hypertonic saline (20%).

Materials and Methods: A total of 48 patients are having Gharbi Type I and II cysts underwent modified PAIR procedure under ultrasound guidance with the use of local anesthesia. 18G needle was used for the puncture of the cysts, and scolicalid agent was introduced. The scolicalid agents used were hypertonic saline in 24 patients and betadine in 24 patients which was allowed to act for a period of 30 min. The cysts were allowed to drain using a pigtail catheter which was left *in situ*. The patients were followed up for a period of 12 months. The therapeutic response was assessed by using serial ultrasound scans in all patients every 3 months for 1 year. Reduction in size, pseudomass formation, and wall calcification were used as assessment parameters.

Results: Reduction in size, pseudomass formation, and wall calcification was seen in 46 patients. Two patients treated using hypertonic saline showed recurrence at 6 months who were then treated with betadine.

Conclusion: Modified PAIR therapy is a cost-effective, safe, well tolerated, and minimally invasive treatment for the treatment of Gharbi Type I and Type II hepatic hydatid cysts. The betadine is a preferred scolicalid agent compared to hypertonic saline.

Key words: Echinococcosis, Hepatic, Hypertonic saline solution, Povidone-iodine, Ultrasonography

INTRODUCTION

Cystic echinococcosis is an infestation caused by the larval form of *Echinococcus granulosus* which is an endemic disease found in the cattle rearing areas of South East Asia namely India.¹ The clinical features of the disease depend on factors such as the size and site of

the cyst. The patients can be asymptomatic or present with abdominal fullness or vague abdominal pain.^{2,3} Surgical management in the form marsupialization and tube drainage, omentoplasty, or hepatectomy was the mainstay of treatment.⁴ Medical management with benzimidazole compounds proved to be effective against the larval forms. Reports of accidental puncture of cysts without any complications led to the development of the percutaneous treatment with the use of scolicalid agent.⁵ In the year 1985, Mueller *et al.* first reported percutaneous treatment of hepatic hydatid cysts.⁶ Subsequently, puncture-aspiration-injection-reaspiration (PAIR) was recommended by the WHO as an alternative method to surgery.⁷ In recent years percutaneous drainage of hepatic hydatid cysts has emerged as a cost-effective, safe, well

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tolerated, and minimally invasive treatment with lack of serious complications like death.^{2,5,8-11}

The purpose of this study was to determine the effectiveness of modified PAIR therapy using hypertonic saline and betadine (povidone-iodine) as scolical agents.

MATERIALS AND METHODS

Patient Selection

The study was carried out from March 2004 to July 2015 in the Department of Radio-Diagnosis, Pt. JNM Medical College, Raipur, India. Inclusion criteria were patients having single or multiple Gharbi Type I (Figure 1) and Type II hepatic hydatid cysts of size more than 5.0 cm. Exclusion criteria were patient unwilling for treatment, Gharbi Type III-V, cysts with biliary communication, and inaccessible cysts. The total of 48 patients underwent the procedure during this period after undertaking a written and informed consent. 20 were female, and 28 were male in the age group of 12-65 years. 35 cysts were Gharbi Type I and 13 cysts were Gharbi Type II. The cyst diameter varied between 5 and 13 cm with average cyst size being 7.3 cm. 38 cysts were in the right lobe while 10 cysts were in the left lobe. 37 patients presented with abdominal pain, 6 patients presented with abdominal discomfort, 2 patients presented with breathing difficulty while 3 patients were asymptomatic.

Procedure

The diagnosis was established using ultrasound machine (Prosound-4000, Aloka, Japan and Aplio-MX, Toshiba, Japan) and serological tests namely ELISA and classification of the hepatic hydatid cysts was done using Gharbi classification. By this classification, Type I cyst refers to a simple cyst without septae, floating membranes, and daughter cysts, Type II cyst refers to a cyst with floating membranes; Type III cyst is a hydatid cyst with daughter cysts, Type IV cyst is a cyst with internal echoes and solid areas, and Type V cyst refers to areas of calcification in the cysts. Communication with the biliary tree was ruled out by examining the cyst fluid for bile pigments and salts. Routine hemogram and liver function tests were performed prior to the procedure. Prophylactic oral albendazole 400 mg twice daily was started 7 days prior to the procedure for all patients to avoid anaphylaxis. Oral albendazole was continued for a period of 1 month after the procedure. After an overnight fast for at least 6 h patients underwent sonographic evaluation for ascertaining the depth of the cyst. Before starting the procedure, emergency tray containing drugs such as adrenaline, atropine, hydrocortisone, and chlorpheniramine maleate was kept ready for anaphylaxis in the form of laryngeal

edema, asthma, hypotension, or shock. After administering local anesthetic (2% lignocaine), the hepatic cysts were punctured using 18 gauge needle (Figure 2) and fluid was aspirated using 8 French or 10 French pigtail catheter (Blue Neem, India) leaving behind only a small amount of fluid to visualize the catheter tip. The aspirated fluid was examined for bile pigments and salts to rule out biliary communication. The scolical agent (20% hypertonic saline used in 24 patients and 10% betadine used in 24 patients) was injected into the cyst and left *in situ* for 30 min after clamping the catheter (Figure 3). The scolical agent injected was two-thirds of the aspirated volume. The scolical agent was reaspirated after 30 min, and the pigtail was left *in situ* (Figure 4). Vital monitoring was done during the entire procedure and for 24 h after the procedure for any feature of anaphylaxis. The catheter was connected to a drainage bag and removed after the 24 h aspirate was <20 ml which was in the range of 2-7 days. The entire procedure lasted for a range of 35-50 min. The patients were followed up for 1 year by ultrasound examination in every 3 months.



Figure 1: Gharbi Type I hepatic hydatid cyst

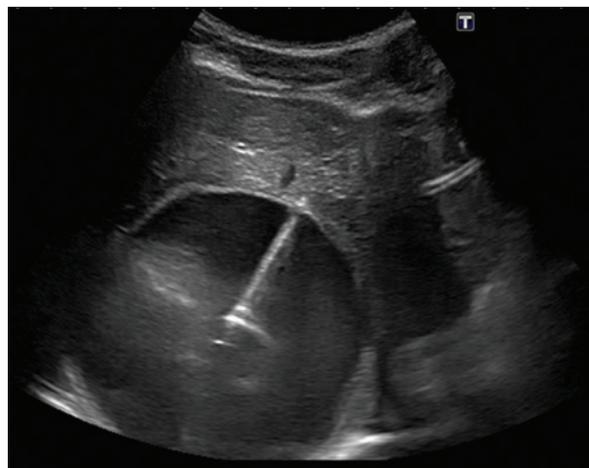


Figure 2: Puncture needle within the cyst

RESULTS

All the 48 patients showed a response to treatment at 3 months follow-up sonography in the form of a reduction in the size



Figure 3: Injection of scolicalidal agent producing internal echoes using pigtail drainage catheter



Figure 4: Pigtail catheter *in situ* post reaspiration



Figure 5: Pseudomass formation at 3 months follow-up

of the cyst. The average size of the cysts after 3 months was 3.5 cm in diameter. Resolution of the presenting symptoms of abdominal pain, abdominal discomfort, and breathlessness was noted in all the patients at the end of 3 months. 41 patients at 6 months follow-up showed pseudomass formation (Figure 5) while 5 patients showed wall calcification. Two out of the 24 patients treated using hypertonic saline as a scolicalidal agent showed recurrence on 6 months follow-up sonography. They were subsequently treated using betadine as a scolicalidal agent. No recurrence was noted in them on follow-up sonography, and pseudomass formation was noted at the end of 6 months. 37 patients showed wall calcification at the end of 1 year on sonography. Further reduction in cyst size was noted in all patients at the end of 1 year with the average size of 2.6 cm. A hospital stay of the patients ranged from 2 to 9 days with an average stay of 5 days. Severe complications like anaphylaxis and death were observed in none of the patients. Pain at the injection site was the most common complication noted in 17 patients which was managed using non-steroidal anti-inflammatory drugs. Febrile illness was noted in 9 patients which was managed using intravenous ceftriaxone for a period of 3 days (Table 1).

DISCUSSION

The hydatid disease is an endemic disease in the cattle rearing areas of South-East Asia namely India and is a major health problem. Until recent times, surgery has been the preferred modality for hepatic hydatid cysts. However, surgery is associated with mortality in up to 6% of the cases.¹² Recurrence rates after surgery has been reported to be from 2% to 25%.¹³⁻¹⁵ Minimally, invasive methods such as PAIR along with oral anti-helminthic therapy is effective with better outcome than surgery in the Gharbi Type I and II cysts with the added advantage of less morbidity, cost effectiveness, and reduced hospital stay. In our study, we classified hepatic

Table 1: Injections of Scolicalidal Agent

Parameters	Scolicalidal agent		Total
	Betadine	Hypertonic saline	
Appearance of cysts			
At 3 months			
Reduction in size	24	24	48
At 6 months			
Pseudomass formation	23	18	41
Wall calcification	3	3	6
Recurrence	-	2	2
At 12 months			
Reduction in size	24	24	48
Wall calcification	20	17	37
Recurrence	-	-	-
Complications			
Pain at injection site	9	10	19
Febrile illness	1	7	8
Hospital stay (average)	4.6 days	5.4 days	5 days

hydatid cysts sonographically using Gharbi classification¹⁶ and treated Gharbi Type I and II cysts. We performed the procedure under sonographic guidance using the transhepatic route for the puncture with the help of a 18G needle. The pigtail catheter was introduced and left *in situ* for the purpose of aspiration, injection, and reaspiration. Various scolicidal agents have been used by various investigators such as 20% hypertonic saline, 95% alcohol, betadine (10% povidone iodine; 1% free iodine).¹⁷⁻¹⁹ WHO recommends the use of hypertonic saline as a scolicidal.⁷ In this study, both 20% hypertonic saline and betadine were used in a randomized manner in an equal number of patients. We observed a reduction in the cyst size in all the patients at 3 months follow-up. It was noted that 2 patients treated with hypertonic saline showed recurrence at the end of 6 months. They were subsequently treated with betadine which showed no recurrence. All the patients treated using betadine showed no recurrence. At the end of 1 year follow-up, all the patients showed a reduction in cyst size while pseudomass formation was noted in 43 patients and wall calcifications in 37 patients. Thus, betadine was 100% effective whereas hypertonic saline was 92% effective which led us to conclude that betadine was a better scolicidal agent. In our study, oral albendazole 400 mg twice daily was administered to all the patients before the procedure and continued for a period of 1 month after the procedure to prevent anaphylaxis and recurrence. Many studies show that modified PAIR is as effective as surgery with lower complication rates.^{11,20-22}

CONCLUSION

Results show that modified PAIR therapy is cost effective, safe, well tolerated, and minimally invasive treatment of Gharbi Type I and II hepatic hydatid cysts with a reduction in hospital stay. In our study, we also concluded that betadine is a better alternative to hypertonic saline.

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Analysis of 62 Cases of Ectopic Pregnancies in a Rural Medical College Set Up at Nalgonda Telangana, India

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Abstract

Introduction: An ectopic pregnancy is emerging as a life-threatening obstetric emergency as the incidence is increasing in the recent times and has a profound effect on future of women's fertility. The objective of our study was to study the clinical profile and management of ectopic pregnancies.

Materials and Methods: The present retrospective study was conducted over a period of 2½ years from December 2012 to May 2015 for risk factors, mode of presentation, treatment modalities, and management of patients with ectopic pregnancy.

Results: On analyzing 62 cases of ectopic pregnancies admitted in medical college, it was found an incidence of 5.22 ectopic pregnancies per 1000 live births. Majority of the patients (53.22%) were in the age group 26-30 years. The second gravida had the highest incidence of ectopic pregnancies (41.93%). Previous tubal ligation was the most common identifiable risk factor, and the majority of cases (24.19%) had a H/O tubectomy. Most of the cases presented with lower abdominal pain (93.54%) followed by amenorrhea (79.03%). The most of the cases (62.90%) in our study had ruptured tubal pregnancy. Unruptured tubal pregnancy was seen in 24.19% cases. Chronic ectopic pregnancy was diagnosed in 8.06% of cases. Interestingly, it was also found three cases of ovarian pregnancy. Partial salpingectomy by the open method was the mainstay of treatment and was done in 79.03% of cases. Eight cases were managed laparoscopically. Partial oophorectomy was carried out for the three cases of ovarian ectopic pregnancy. Two cases were successfully managed by medical management with intramuscular methotrexate.

Conclusion: Although ectopic pregnancy can never be completely prevented, but the incidence can be reduced, and much of the morbidity and mortality is also preventable with efficacious diagnostic and interventional strategies aimed principally at women who are at high risk for ectopic pregnancy.

Key words: Amenorrhea, Ectopic, Pregnancy, Salpingectomy, Tubal

INTRODUCTION

The ectopic pregnancy is one of the most dreaded life-threatening obstetric emergencies in early pregnancy. It is defined as ectopic implantation of the embryo at sites other than the normal uterine cavity, unfavorable

for further growth, and development of the embryo. In about 95% of ectopic pregnancies, the fertilized ovum implants in the tubes, but rarely in other organs such as abdomen, ovaries, cervix, spleen, omentum, cesarian section scar, and intramural. The risk factors for ectopic pregnancy include pelvic inflammatory disease (PID), previous tubal surgery, previous ectopic pregnancy, progestin contraceptive, assisted reproduction, ovulation induction, induced abortion, salpingitis isthmica nodosa, smoking, and diethylstilbestrol exposure.^{1,2} Most of the tubal pregnancies become symptomatic within 12 weeks, but a small number of them progress beyond this gestation and are diagnosed late.³ Consequently, there is a fetal loss with increased maternal morbidity and

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mortality, also compromising future fertility potential. Early diagnosis of ectopic pregnancy is a difficult task but can be possible with the help of quantitative beta-human chorionic gonadotropin (β -HCG) level, transvaginal ultrasonography, and laparoscopy.^{4,5} In spite of the advances in diagnostic methods and management, ectopic pregnancy still remains a very serious threat to maternal safety. Identifying the risk factors and taking steps to reduce them, improves morbidity, mortality, and fertility outcomes. The purpose of present study was to highlight the clinical profile of patients of ectopic pregnancy, to identify the risk factors and to study the various modalities of management in Kamineni Institute of Medical Sciences, Sreepuram, Narketpally.

MATERIALS AND METHODS

The present study is based on an analysis of 62 cases of ectopic pregnancy admitted to Kamineni Institute of Medical Sciences, Sreepuram, Narketpally over a period of 2½ years from December 2012 to May 2015. The age, parity, marital status, and presenting symptoms were recorded. History of any prior surgery, tubal surgery, infertility, PID, previous ectopic or any medical disorder deemed to be significant, was taken.

Vitals were recorded and a thorough abdominal and bimanual examination was done.

The diagnosis was made with the help of urine pregnancy test and ultrasonography. The abdominal findings on exploration were recorded. Treatment given was recorded as either medical or surgical.

OBSERVATION AND RESULTS

In the present study conducted over a period of 2½ years, the total number of deliveries was 11,861, and the total number of ectopic pregnancies were 62; giving an incidence of 5.22 per 1000 live births.

In the present study, it was found that the majority of ectopic pregnancies, that is 53.22%, occurred in the females of the age group 26-30 years (Table 1).

Second gravide at 41.93% accounted for the maximum number of ectopic pregnancies in the present study (Table 2).

Table 3 shows that more than half of the patient, i.e. 59.65%, had identifiable risk factors, the most important one being a history of tubal ligation at 24.19%. This was followed by a history of prior surgery in 16.12%, a history

of infertility in 9.67%, a history of PID in 6.45%, and a history of previous ectopic pregnancy in 3.22% of cases. In the rest 40.32% patients, there was no identifiable risk factor.

The majority of the patients presented with lower abdominal pain (93.54%), followed by amenorrhea, abnormal uterine bleeding, and syncopal attack. Cervical motion tenderness was elicited in 75.80% of cases (Table 4).

Table 1: Agewise distribution of ectopic pregnancy cases in present study

Age group	Number of cases n=62 (%)
20-25	14 (22.58)
26-30	33 (53.22)
31-35	10 (16.12)
36-40	5 (8.06)

Table 2: Gravidity in present study

Gravidity	Number of cases n=62 (%)
1	18 (29.03)
2	26 (41.93)
3	12 (19.35)
4	6 (9.67)

Table 3: Risk factors for ectopic pregnancy in present study

Risk factors	Number of patients n=62 (%)
H/O PID	4 (6.45)
H/O tubal ligation	15 (24.19)
H/O previous pelvic surgery	10 (16.12)
H/O previous ectopic	2 (3.22)
H/O infertility	6 (9.67)
No identifiable risk factors	25 (40.32)

PID: Pelvic inflammatory disease

Table 4: Symptomatology in present study

Clinical features	Number of cases n=62 (%)
Lower abdominal pain	58 (93.54)
Amenorrhea	49 (79.03)
Cervical motion tenderness	47 (75.80)
Adnexal mass or fullness	39 (62.90)
Abnormal uterine bleeding	45 (72.58)
Abdominal guarding and rigidity	40 (64.51)
Syncopal	10 (16.12)

Table 5: Modalities of management in present Study

Management	Number of patients n=62 (%)
Partial salpingectomy (open)	49 (79.03)
Laparoscopic partial salpingectomy	8 (12.90)
Partial oophorectomy	3 (4.83)
Medical management	2 (3.22)

Table 6: Site and acuity of ectopic pregnancy in present study

Site and acuity	Number of cases n=62 (%)
Ruptured (tubal)	39 (62.90)
Unruptured (tubal)	15 (24.19)
Chronic (tubal)	5 (8.06)
Ovarian pregnancy	3 (4.83)

In the present study, surgery in the form of salpingectomy either by open method or laparoscopically and partial oophorectomy was the mainstay of the treatment (Table 5). Medical management with methotrexate was offered to two cases.

Upon opening the abdomen, tubal pregnancies of different acuity (Table 6) was found except in three cases where the site of ectopic pregnancy was found in the ovary.

DISCUSSION

The incidence of ectopic pregnancies is on the rise. Centers for Disease Control USA 1 has reported a 4-fold increase in its incidence from 1970 to 1983, 4.5 to 16.18 per 1000 pregnancies.⁶ At the same time, the fatality rate has also decreased from 35.5 to 3.8 per 10,000 ectopic pregnancies, a decrease by 90%. In a multicentric case-control study in India, (ICMR Task Force Project, 1990) the incidence of ectopic pregnancy is 3.12 per 1000 pregnancies or 3.86 per 1000 live births. In the present study, the incidence of ectopic pregnancy was 5.22 per 1000 live births which are similar to the study by Ayaz *et al.* where they found an incidence of 5.8 per 1000 live births.⁷

In present study, peak age of incidence of ectopic pregnancy is 26-30 years at 53.22%. This is almost similar to the study conducted by Mufti *et al.*⁸ where 55.25% of patients were in the age group 26-30 years. Similar results were also found by Majhi *et al.*⁹ in their analysis of 180 cases of ectopic pregnancy. Westrom in Sweden¹⁰ and Rubin *et al.* in the USA,¹¹ however, reported an increasing incidence of ectopic pregnancy with age. This difference may be because in our country women marry at an earlier age and finish childbearing earlier too.

In present study more than half of the patients, i.e. 59.65%, had an identifiable risk factors such as H/O PID in 6.45%, H/O prior tubal ligation in a significant percentage of patients at 24.19%, H/O prior pelvic surgery in 16.12%, H/O previous ectopic in 3.22%, and H/O infertility in 9.67%. Similar to our study, Patel *et al.* in their study found that 30.8% of cases had ectopic pregnancy following tubal ligation.¹² In contrast to the present study, studies by Mufti

et al., Majhi *et al.*, had a higher incidence of H/O prior abortion as the most common identifiable risk factor. Increasing the incidence of Cesarean section, and tubal ligation over the years at the institute and in general, can be attributed as the causative factor for increased incidence of post tubal ligation ectopic pregnancy in our study. Vyas and Vaidya¹³ found PID as the commonest risk factor with an incidence of 25% in their study of 192 cases of ectopic pregnancy.

In recent years, the incidence of ectopic pregnancy is on the rise in women attending infertility clinics even in the absence of tubal disease.¹⁴ Assisted reproductive technology adds to the risk of ectopic pregnancies. *In vitro*, fertilization is associated with an ectopic pregnancy risk of 2-5% and even higher if associated with the tubal disease. Patel *et al.* in their study on ectopic pregnancy in their institute found the H/O infertility in 42.3% of cases.¹²

Abdominal tenderness is the commonest presenting sign and pain lower abdomen is the commonest symptom which was present in 93.54% of cases in our study. This was similar to the study conducted by Patel *et al.*,¹² where they recorded this in 92.3% of cases. Cervical motion tenderness was present in 75.80% cases which was almost similar to the study by Patel *et al.*¹² where they recorded it in 82.69% of cases studied.

The treatment options in cases of ectopic pregnancy are:

- Surgical treatment
- Surgically administered medical treatment
- Medical treatment
- Expectant management.

Newer techniques, especially recent advances in laparoscopic surgery, have brought in an era of conservative surgical management. In the present study, surgery by the open method was the mainstay of treatment, and 79.03% of cases were managed by partial salpingectomy. This was similar to study by Mufti *et al.*,⁸ where salpingectomy was done in 74.48% cases. Laparoscopic management was done in 8 (12.90%) cases which was almost similar to the study by Patel *et al.*,¹² where they managed 13 (25%) cases laparoscopically. In almost all the cases of ovarian ectopic pregnancies, ovary can be preserved because the implantation is usually superficial.¹⁵ Partial oophorectomy was done in 3 (4.83%) of our ovarian ectopic pregnancy cases. Medical management was successfully implemented in two cases where the patients were managed by a single dose of injection methotrexate intramuscular and were subsequently monitored for decreasing serum levels of serum β -HCG successfully.

CONCLUSION

The study on ectopic pregnancy which was conducted in Kamineni Institute of Medical Sciences, Sreepuram, Narketpally, aimed at analyzing ectopic pregnancies, the incidence, and the various risk factors, presenting symptoms associated with it, the acuity and the modalities of management utilizing the resources available at our hand. In presented study done in a medical college in the midst of a rural setup, the most common risk factor associated with ectopic pregnancy was a history of a previous tubal ligation. The most of the cases had undergone tubectomy in camps and hence the only possible explanation could be improper aseptic measures leading to scarring of the tubes as a result of post tubectomy infection or inflammation. PID, infertility, a prior pelvic surgery, and a previous ectopic pregnancy are other identifiable risk factors leading to ectopic pregnancy. A high degree of clinical suspicion of ectopic pregnancy must be held in the presence of any of the risk factors unless proved otherwise.

The rising number of cases of ectopic pregnancy poses a serious concern over maternal mortality. With advances in the field of medicine, more young women are adopting newer fertility control methods such as newer oral contraceptives, intrauterine contraceptive device, and various tubal surgeries to limit their families. Moreover, newer drugs for ovulation induction and tubal reconstructive surgeries have led to delayed conception with increased risk of ectopic pregnancy. Although ectopic pregnancy can never be completely prevented, but its incidence can be reduced along with reduction of maternal morbidity and mortality by efficacious diagnostic and

interventional strategies aimed at all the women at high risk for ectopic pregnancy.

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Pattern of Malignant Tumors in a Teaching Hospital of Western India

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Abstract

Background: Diseases such as cancer and other non-communicable diseases are fast replacing communicable diseases in India and other developing countries. The burden of cancer is still increasing worldwide despite advances for diagnosis and treatment.

Purpose: To study pattern and histopathological subtypes of the different malignant tumors operated in a medical college associated hospital of western India.

Materials and Methods: All biopsies submitted for histopathology to pathology department Gujarat Medical Education and Research Society Medical College, Sola, Ahmedabad from April 2010 to March 2015, included in study. All biopsies were reviewed. Analysis was performed for age, site and diagnosis in patients with malignant lesions.

Results: Total 7209 biopsies were received. Out of it 229 cases were diagnosed as malignant lesions. 125 (54.59%) cases were female patients in which most common malignancy was breast carcinoma, followed by squamous cell carcinoma of oral cavity and carcinoma of cervix. 104 (45.41%) cases were male patients and most common malignancy was squamous cell carcinoma of oral cavity followed by carcinoma of penis and gastrointestinal adenocarcinoma.

Conclusion: Site-specific data in this study can augment the National Cancer Registry Program and is an essential indicator for the magnitude and pattern of the cancer problem in India.

Key words: Histopathology, Malignancy, Pattern of cancer, Prevalence, Site

INTRODUCTION

Cancer has become one of the leading causes of deaths worldwide. An epidemic of cancer has transited beyond the geographical boundaries of countries. Our Earth is under the effect of cancer that is spreading rapidly, and the burden of cancer is still increasing daily even though there is a lot improvement in methods of diagnosis and treatments.^{1,2} It has become a challenge for any healthcare system. Every year nearly 10 million people are being diagnosed as having some type of cancer out of which

about 6 million people dies.² Apart from cancers due to genetic defect, around 80-90% of cancers develop due to lifestyle and environment factors.¹

In our country prevalence of cancer is less compared to developed countries, it has increased during past few decades. Every year on an average 0.7 million new cases are being diagnosed. It adds to the prevalence of 2.5 million, out of which nearly half of the patient dies within few years. Over 70% of the cases report for diagnosis and treatment in advanced stages of the disease. It is one important cause of poor survival and high mortality rates in cancer patients.^{2,3} There is variation in ethnicity and socioeconomic status in different people in our country. It has a major influence on lifestyle and beliefs and leads to differences in cancer incidence and mortality.⁴

Globally in the male lung, stomach and colorectal cancers are the leading cancers, whereas breast, lungs, and stomach

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cancer constitute top three leading cancers in female.³ In contrary the common sites for cancer in Indian male are an oral cavity, lungs, esophagus and stomach and cervix, breast, and oral cavity among Indian female. Even within India, there are variations in the prevalence and pattern of different cancers.² In Southern India, the common cancers among male were of stomach, oral cavity, esophagus, and leukemia whereas in females leading causes of cancers were of cervix, breast, oral, and esophageal. Similarly, a study from West Bengal, an Eastern state of India has showed head and neck, lungs, and oral cancers are predominant in males, whereas among female breast cancer was leading cause of cancer followed by cervical and stomach cancers. In contrast, among North India male major cases of cancer are of gastro-intestinal tract (GIT), larynx and lung. In North Indian female breast, cervix and lung were leading causes of malignancies.²

There is need of obtaining more information on cancer epidemiology such as prevalence, incidence, and risk factors to generate evidence, which will help in taking effective measures to prevent and control the cancer epidemic in the country. There is limited published cancer data available in the state of Gujarat. Due to existence of diverse pattern of cancer occurrence, we conducted the present study to explore the pattern and trend of cancer among patients of Gujarat the West Indian state.²

MATERIALS AND METHODS

We conducted a retrospective study in Gujarat Medical Education and Research Society Medical College, Sola, Ahmedabad in Gujarat. This hospital-based study was conducted for the period April 1st, 2010 to March 31st, 2015. The study subjects consisted of all cases diagnosed as cancer. Tissue biopsies received in histopathology section of the pathology department. They fixed in buffered formalin. Thorough gross examination of specimen was done. Appropriate sections taken as per the standard guideline mentioned in the textbook. After processing in tissue processor, sections were cut and stained with H and E stain. Special stains and immunohistochemistry were done wherever needed. The diagnosis offered on histological evaluation. Tumor, node, metastasis staging and classification of the tumor done in specimens with radical surgery.

RESULTS

Total 7209 biopsies received from April 2010 to March 2015. Out of that, 229 patients were diagnosed as having cancer. In present study, 104 (45.41%) were males and

125 (54.59%) were females diagnosed as having cancer with the male:female ratio of 1:1.2.

Table 1 shows age distribution of these patients. The incidence of cancer was highest 34.93% in age group 41-50 years. It was very low in the age group below 30 years.

Table 2 shows the most common type of malignancy was squamous cell carcinoma affecting 118 (51.52%) patients. In females most common type of malignancy were breast carcinoma 43 (23.14%) followed by squamous cell carcinoma of oral cavity 18 (8.69%), cervical cancers 14 (6.11%) and GIT malignancies 12 (5.24%). In males most common type of malignancy was squamous cell carcinoma of oral cavity 67 (29.25%) followed by squamous

Table 1: Age distribution of patients in cancer patients

Age (years)	Number of cases	Percentage
≤20	3	1.31
21-30	13	5.67
31-40	41	17.90
41-50	80	34.93
51-60	45	19.65
61-70	32	13.97
71-80	15	6.55
Total	229	100

Table 2: Different types of malignancies in males and females

Organ/site	Type of malignancy	Male (%)	Female (%)
Oral cavity	SCC	67 (29.25)	18 (7.86)
Penis skin	SCC	10 (4.36)	-
Cervix and vulva	SCC	-	14 (6.11)
Lymphnode (metastasis)	Metastatic SCC	5 (2.18)	1 (0.43)
Foot	SCC	2 (0.87)	-
Rectum anal canal	SCC	1 (0.43)	-
Breast	Invasive ductal carcinoma	0	53 (23.14)
GIT	Adenocarcinoma	6 (2.6)	12 (5.24)
Ovary	carcinoma	-	5 (2.18)
Thyroid gland	carcinoma	1 (0.43)	6 (2.62)
Skin	BCC	2 (0.87)	3 (1.31)
Skin	Malignant melanoma	2 (0.87)	3 (1.31)
Uterus	Endometrial carcinoma	-	4 (1.74)
Testis	Testicular carcinoma	2 (0.87)	-
Lymph node	Lymphoma	2 (0.87)	1 (0.43)
Kidney	Renal cell carcinoma of kidney	2 (0.87)	1 (0.43)
Salivary gland	Mucoepidermoid carcinoma of salivary gland	1 (0.43)	1 (0.48)
	Others	1 (0.43)	3 (1.31)
	Total	104 (45.41)	125 (54.59)

SCC: Squamous cell carcinoma, BCC: Basal cell carcinoma

cell carcinoma of penis 10 (4.83%) and carcinomas of GIT 6 (2.6%).

DISCUSSION

Contributing factors such as modern civilization, industrialization, urbanization, changes in daily lifestyle, population growth, and aging, are responsible for epidemiological changes in many diseases, including cancers, in India as well as other countries.⁵ Data of occurrence of cancer in different areas are very important. Cancer is an endemic disease as it affects every nation. However, it has considerable variation in frequency according to the site incidence. The geographical differences in incidences help us to get an idea of causative factors. It also helps us in separating environmental and ethnic factors from intrinsic factors. The total world incidence shows that cancer is an enormous health problem, and it is the second killer disease in humans. The burden of cancer is increased globally, and it has shifted from high to low and medium-resource countries. It is both due to demographic changes and by temporal and geographic shifts in the distribution of the major risk factors. The most important factors that contribute to these change in trends are growth and aging of populations, the entrenchment of modifiable risk factors particularly cigarette smoking, western diet and physical inactivity in developing countries and the slower decline in cancers related to infectious etiologies.³

Cancer can cause both social and economic consequences for Indian people, often leading to family impoverishment and societal inequity. Age-adjusted incidence rates for cancer are still quite low in the demographically young country. More than 1 million new cancer cases are diagnosed every year in a population of 1.2 billion. In age-adjusted terms, this represents a combined male and female incidence of about a quarter of that recorded in Western Europe. However, an estimated 600,000-700,000 deaths in India were caused by cancer in 2012. In age-standardized terms, this figure is very close to the burden of mortality seen in high-income countries. These figures are partly indicative of low rates of early-stage detection and poor treatment outcomes. Etiology of many cancer cases in India are tobacco use, infections, and other avoidable causes. Social factor, like inequalities determines India's cancer burden, with poorer people more likely to die from cancer before the age of 70 due to lack of money for proper treatment.⁵

The present study represents that more number of females reported in comparison to males with the ratio of 1:1.2. It is comparable with that of cancer incidence in Murthy and Mathew study and Deshpande *et al.* study.^{1,6} Trend analysis of cancer incidence in India for the period from

1964 to 1996 showed that the overall rates of cancer are increasing with greater increase among females. The trend is reverse to global trend (IARC, 2008). It may be due to the fact that Indian females are at a higher of risk of getting cancer as compared to males (IARC, 2008; ICMR, 2010) and main cause of it is reproductive risk factors among Indian females and recent lifestyle changes in Indian communities.^{2,7,8} The largest increase among females was seen in cases of breast cancer and among males cases of the prostate cancers. Increasing trends noticed in cases of lymphoma, urinary bladder, gall bladder and brain tumors in both sexes. There is also increase in cancer of the colon in females and kidney cancer in males. Esophageal and stomach cancers were decreasing in both. Cervical cancer showed a decreasing trend,^{1,5} and this could be due to reproductive risk factors among Indian females have changed and recent lifestyle changes in Indian communities.

In our study, mouth is the leading site of cancer among males (31.4%) followed by squamous cell carcinoma of penis and GIT carcinoma. Head and neck neoplasia constitute one of the commonest cancers in India. Consumption of tobacco is one of the most important avoidable cancer risk factor for development of this neoplasia. Between 25% and 30% of all cancers in developed countries is tobacco-related.¹ Our country is the third largest producer and consumer of tobacco. History of our country shows that there is a variety of ways of using tobacco like chewing and smoking. The habits of use vary from area to area. Data show a habit of chewing tobacco is 15-70% and smoking is 23-77% in different part of India.¹ It has been estimated that in 1996, 184 million persons used tobacco in the country in one or other form.¹ The risk of having cancer due to tobacco use is investigated extensively. There is higher incidence of cancers of the lung, larynx, esophagus, pancreas and bladder due to tobacco consumption. Bidi smoking is cause of cancer of oropharynx as well as larynx.^{9,10} Tobacco-related cancers account for nearly 50% of all cancer cases among men and 25% of all cancers among women.^{1,11} Oral and pharyngeal cancers have a high incidence in South Asia, even among women. In this area, people use of smokeless tobacco orally which is considered the predominant risk factor for oral cancers.⁶ The trend show rise in mouth cancer in Mumbai and Delhi Population-Based Cancer Registry among male, whereas among female there is reverse trend. This cancer could be attributed to increase in tobacco consumption among males in any form.¹

Breast cancer is the leading site of cancer followed by squamous cell carcinoma of oral cavity, cancers of cervix uteri and GIT adenocarcinomas cancers, in females. Breast cancer is most common and leading cancer among female around the world. The incidence of breast cancer is increasing in India. There are estimated 80,000 new

cases diagnosed annually. The rise of incidence of breast cancer increased by approximately 50% between the years 1965 and 1985. Much of this increase is due to greater urbanization and improved life expectancy. The incidence rate is higher in urban areas compared with rural areas. Furthermore, age at puberty and pregnancy-related factors such as parity, age at giving birth to first child, and a number of children are factors possibly related to breast cancer.¹²

Cancer prevention includes primary and secondary prevention methods. Primary prevention refers to avoiding carcinogens in the environment or dietary elements and dietary supplementation with putative protective agents. Secondary prevention aims at early detection and treatment of premalignant conditions of oral, cervical, and breast cancers.¹

Non-communicable diseases including cancer are emerging as public health problems in India. The major risk factors for these diseases are tobacco, dietary habits, inadequate physical activity, alcohol consumption, and infections due to viruses. Primary prevention is the most important cause to reduce the burden of cancer. Extensive health education is required to be directed to control/reduce the use of tobacco. Education about proper nutrition, safe sexual practices and attention to personal and genital hygiene is needed for increasing public awareness. Prophylactic vaccinations against human papilloma virus and hepatitis B virus infection are useful strategies for the prevention of carcinoma of the cervix and in the control of liver cancer. Further, screening for uterine cervix, oral and breast cancers could have a significant effect on reducing mortality from cancer.

CONCLUSION

Cancer is emerging as an important health problem in developing country. It is the second leading cause of death in the world. Half of all men and one-third of all women will develop cancer during their lifetime. Millions of

people are either living with cancer or had cancer. This work is just a brief insight in the broad and complicated field of cancer. This presented epidemiological data on cancer provides valuable information on patterns of cancer prevalence and incidence. By knowing the type and occurrence of different tumors, we can plan preventive measures such as eradication of tobacco use, vaccination, and genetic screening. We can also prepare strategies for early diagnosis and treatment of patients to increase their 5-year survival rate.

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Clinico-radiological Spectrum of Posterior Reversible Encephalopathy Syndrome: A Study from Teaching Hospital in North Karnataka

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Abstract

Background: Posterior reversible encephalopathy syndrome (PRES), is characterized by neuroimaging findings of reversible vasogenic subcortical edema without an infraction. A clinical diagnosis of PRES includes the presence of encephalopathy, seizures, headache, and visual symptoms, as well as radiologic findings of focal reversible vasogenic edema, best seen on magnetic resonance imaging of the brain.

Objective: To retrospectively identify patients with PRES with a characteristic clinical presentation and neuroimaging abnormalities.

Materials and Methods: A 54 patients were included in the study. Medical records of these patients were reviewed for demographic data, clinical history, blood pressure measurements, laboratory investigations, predisposing condition and neuroimaging. The primary etiology of PRES was determined for each case on the basis of the diagnosis of the attending clinician's.

Results: Out of the 54 retrospectively identified cases, 48 were females and 6 were males. Mean age of the patients at presentation was 30.94 years. The most common clinical presentation was seizures, seen in 44 patients (81.48%). Primary etiologies of PRES included hypertension ($n = 21$ [38.88%]), normotension ($n = 07$ [12.97%]), pre-eclampsia, or eclampsia ($n = 14$ [25.92%]).

Conclusion: PRES is an under-diagnosed condition, needs a high degree of suspicion for diagnosis. In this study, females are commonly affected, and most of them were in a postpartum period and had a good prognosis.

Key words: Encephalopathy, Pre-eclampsia, Vasogenic

INTRODUCTION

Reversible posterior leukoencephalopathy syndrome also referred as posterior reversible encephalopathy syndrome (PRES), is characterized by neuroimaging findings of reversible vasogenic subcortical edema without the infraction.¹ The clinical diagnosis of PRES includes the presence of encephalopathy, seizures, headache, and visual symptoms, as well as radiologic findings of focal reversible

vasogenic edema, best seen on magnetic resonance imaging (MRI) of the brain.² This syndrome can be triggered by pre-eclampsia or eclampsia, hypertensive emergencies, renal disease, sepsis, exposure to immunosuppressive agents, and rarely autoimmune disorders.²⁻⁶ Despite the syndrome's name, radiographic lesions in PRES are rarely isolated to the "posterior" parieto-occipital white matter and instead of involve the cortex, frontal lobes, basal ganglia, and the brain stem.^{1,7} The pathophysiology of PRES remains elusive. Several theories have been proposed.² The hypertension related PRES is due failure of cerebrovascular autoregulation, which in turn results in vasogenic edema.⁸ Non-hypertensive PRES may be due to the immune response to various stimuli. Early recognition of PRES is important for the timely institution of therapy. Over the past 5-10 years, it has been diagnosed the more frequent due to greater awareness and the availability of

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better non-invasive diagnostic techniques. Though several studies were done in India and elsewhere on PRES, it has not been extensively studied of late. The purpose of this study was to describe the demographics and clinic-radiologic profile of PRES.

MATERIALS AND METHODS

We retrospectively identified patients with PRES between September 2011 and August 2014. 54 patients were included in the study. Medical records of these patients were reviewed for demographic data, clinical history, blood pressure measurements, laboratory investigations, predisposing condition, and neuroimaging. The primary etiology of PRES was determined for each case on the basis of the diagnosis of the attending clinician.

Inclusion Criteria

The presence of all three of the following criteria was mandatory for inclusion.

1. Clinical history of acute neurologic change including a headache, encephalopathy, convulsions, visual symptoms, or focal deficit
2. MRI brain findings of focal vasogenic edema
3. Clinical or radiologic proof of reversibility.

Exclusion Criteria

Cases with alternative diagnosis, not favoring inclusion criteria were excluded from the study.

Statistical Methods

The results were analyzed by calculating percentages, and the mean values.

Statistical Software

The statistical software namely SPSS 15.0, STATA 8.0, MEDCALC 9.0.1, and SYSTAT 11.0 were used for the analysis of the data and Microsoft word and excel have been used to generate the tables.

RESULTS

Demographics and baseline characteristics of the patients are depicted in Table 1.

Demographic Profile

Out of the 54 retrospectively identified cases, 48 were females, and 6 were males. The mean age of the patients at presentation was 30.94 years (maximum-minimum, 17-80 years).

Clinical Profile

The most common clinical presentation was seizures, seen in 44 patients (81.48%), including 39 with generalized

Table 1: Demographics and baseline characteristics of the patients

Variable	Number of patients (%)
Demographics	
Males	13 (24.07)
Females	41 (75.93)
Male:female	1:8
Mean age	30.94
Clinical presentation	
Seizures	44 (81.48)
Headache	36 (66.67)
Vomiting	24 (44.44)
Altered sensorium	22 (40.74)
Visual disturbances	09 (16.67)
Etiology	
Acute hypertension	21 (38.88)
Normotensive	07 (12.97)
Pre-eclampsia or eclampsia	14 (25.92)
Sepsis	06 (11.11)
Renal failure	04 (7.40)
Immunosuppression	02 (3.7)
Neuroimaging findings	
Parieto-occipital lobes	27 (50)
Frontal lobe	14 (25.92)
Temporal lobe	09 (16.67)
Cerebellum	08 (14.81)
Basal ganglia	05 (9.25)
Brainstem	03 (5.55)
Subcortical	20 (37.03)
Cortical	03 (5.55)
Deep white matter	07 (12.96)

tonic-clonic seizures, 3 with focal seizures, and 2 with status epilepticus. One had a history of epilepsy. Other clinical presentations included headache in 36 patients (66.67%), vomiting in 24 patients (44.44%) and altered sensorium in 22 cases (40.74%), visual disturbances in 09 cases (16.67%).

Etiological Profile

Primary etiologies of PRES included hypertension ($n = 21$ [38.88%]), normotension ($n = 07$ [12.97%]), and pre-eclampsia or eclampsia ($n = 14$ [25.92%]). Out of 41 females, 26 were in postpartum period. Other causes were sepsis ($n = 6$ [11.11%]), 3 had pneumonia and 1 had urosepsis), renal failure ($n = 4$ [7.40]), and 2 were on immunosuppressive medications.

Radiologic Findings (Figures 1-3)

The most common location was the parieto-occipital and cerebellar region ($n = 35$ [64.81%]), followed by frontal lobe ($n = 14$ [25.92%]), temporal lobe ($n = 09$ [16.67%]), and basal ganglia ($n = 05$ [9.25%]). 20 (37.03%) had cortical involvement, and 3 (5.55%) had subcortical involvement. The lesions were asymmetrical in 40 cases and symmetrical in 14 cases.

Outcome

53 patients recovered with the appropriate treatment, and one expired. Expired patients had severe sepsis with multiorgan dysfunction.

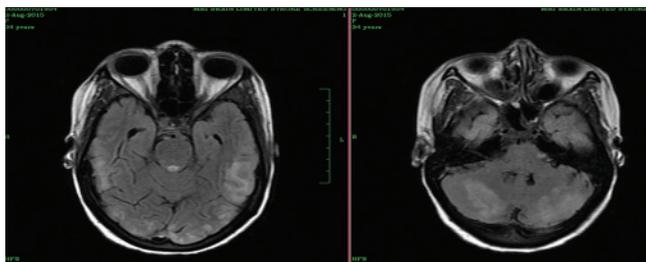


Figure 1: Patient 1-areas of altered signal intensity appearing hyperintense on fluid attenuation inversion recovery images seen in bilateral parieto-occipital region

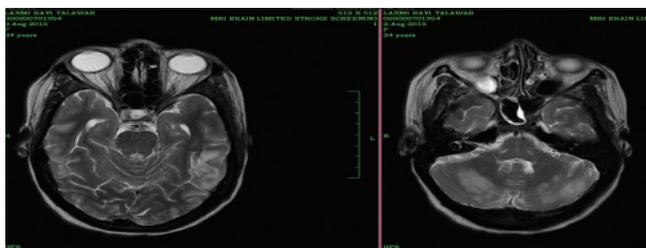


Figure 2: Patient 17-areas of altered signal intensity appearing hyperintense on fluid attenuation inversion recovery images seen in bilateral parieto-occipital region

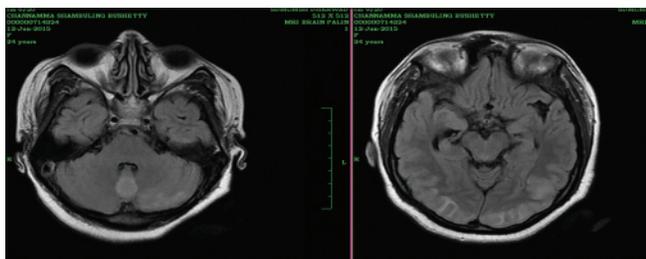


Figure 3: Patient 33-bilateral asymmetrical areas of hyperintense signal are seen in bilateral parieto-occipital areas

DISCUSSION

As the name implies, PRES is classically associated with the features of subcortical vasogenic edema, patchy symmetrical bilateral involvement with the preferential involvement of the posterior head regions, and complete clinical and radiological resolution.⁹ The clinical signs and findings on the neuroimaging in patients with the PRES are consistent enough that this entity should be readily recognizable. Its causes are diverse, but common precipitants are acute elevations of blood pressure, renal decompensation, fluid retention, and treatment with immunosuppressive agents.⁹

The pathophysiology of PRES remains elusive. Several theories have been proposed, the most wide accepted of which states that rapidly developing hypertension leads to a breakdown in cerebral autoregulation, particularly in the posterior head region where there is a relative lack of sympathetic innervation. Hyperperfusion ensues

with protein and fluid extravasation, producing focal vasogenic edema.^{2,10} An alternative theory, which has been best characterized in pre-eclampsia, eclampsia, and sepsis implicates endothelial dysfunction. A third theory proposes that vasospasm with subsequent ischemia may be responsible.

Early recognition of PRES is important for the timely institution of therapy, which typically consists of gradual blood pressure control and withdrawal of potentially offending agents. Although reversible by definition, secondary complications, such as status epilepticus, intracranial hemorrhage, and massive ischemic infraction, can cause substantial morbidity and mortality.¹¹

The observations are compared with the studies done by others on the PRES. In our study of 54 patients, maximum numbers of cases (76.93%) were seen in females in the age group of 21-40 years. This correlates well with a similar study by Fugate *et al.*² (65%). The mean age of onset in the present study was 30.94 years which is comparable with Patil *et al.*¹² study (29.90 years).

The most common clinical presentation was seizures, seen in 44 patients (81.48%), including 39 patients with generalized tonic-clonic seizures. These findings are comparable with Fugate *et al.*² study (74%).

Cho and Lee¹³ in their study reported that PRES associated with the pregnancy, in the peripartum period presented with the seizures - Generalized tonic-clonic type, headache and visual disturbances. Similarly in our study, PRES is predominantly affected in postpartum female population.

Pedraza *et al.*¹⁴ reported that PRES is most common associated with hypertension, pre-eclampsia-eclampsia, and HELLP syndrome. Similarly, findings are noted in our study also.

The most common location in the neuroimaging in this study was the parieto-occipital and cerebellar region (64.81%), followed by frontal lobe (25.92%), temporal lobe (16.67%), and basal ganglia (9.25%). These findings are comparable with Fugate *et al.*² study and McKinney *et al.*¹⁵ study.

CONCLUSION

PRES is a challenging condition because of its variability of clinical symptoms and signs. A high index of clinical suspicion is needed to diagnose PRES. Data from observational studies on outcome and mortality in PRES scarce. We found many of the classic etiologies and triggering factors known to be

associated with PRES, including acute hypertension, pre-eclampsia-eclampsia, and sepsis. The overall prognosis for survival and functional independence is better in PRES when compare with other neurological conditions.

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Self-medication for Medical Abortion in Rural Scenario: Why to choose Unsafe Way?

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Abstract

Background: Abortion has been legal in India for over 40 years, yet more than half of all abortions are unsafe. Medical methods of abortion have been proven to be effective and safe option to save women's lives when practiced under medical supervision. However due to lack of knowledge regarding abortion rights, medical abortion, and safe abortion services, many women dependent on self-administration for abortion that could be highly dangerous if neglected or concealed. The study evaluates magnitude and outcome of self-medication and gives a faint idea about factors prevailing women to choose unsafe ways to terminate unwanted pregnancies in our scenario.

Materials and Methods: A retrospective observational study included 142 patients with history of unsafe medical abortion by self-administration of misoprostol and mifepristone or medical abortion pills, conducted in Chhattisgarh Institute of Medical Sciences a Government Medical College, Bilaspur, during the period of June 2009 to May 2014.

Results: In our study period, total cases of unsafe abortion admitted with complication were 400 of which 142 (35.5%) women had a history of self-medication. Majority of patients were surprisingly educated, rural, from the low socioeconomic background and Hindu by religion. The most frequent complain for admission was severe bleeding. The majority sought an abortion in the first trimester. The most common reason for the termination was unintended pregnancy. The major complications observed in 51 (35.9%) cases only and surgical interventions required in 64 (45%) women.

Conclusion: Every woman is entitled to access quality health services including safe abortion. Yet for decades a matter of protecting health and lives of women has been neglected which really needs quick attention and necessary actions.

Key words: Abortion, Mifepristone, Misoprostol, Self-medication, Unwanted pregnancies

INTRODUCTION

In India, around 6.4 million abortions are performed annually, of which 56% are unsafe which accounts for 8-20% of all maternal deaths.^{1,2} As per Family welfare statistics latest number of induced abortions in India is estimated to be 6,36,306 with an annual rate of about two abortions per 1,000 women aged 15-49 years in 2013.³ However, these numbers greatly underestimate the actual

incidence of abortion for several reasons. They exclude abortions completed using medical abortion pills (MAP) sold without a prescription by pharmacists (who represent an important source of abortion services since medical abortion became available for sale by prescription starting in 2003)⁴, as well as abortions done by untrained providers. It is also likely that many abortions performed by registered providers in certified facilities are not reported because of deficiencies in data reporting systems and data collection practices.¹

However, since 1988, a new and easier alternative has existed in the form of medical abortion.⁵ The term "medical abortion" refers to pregnancy termination with abortion-inducing medications (MAP) in the place of surgical intervention. Various drugs and combinations have been used for first trimester abortion. The most widely researched

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drugs and popular combination is of mifepristone with misoprostol, when taken within the first nine weeks of pregnancy, these pills are associated with a 98% success rate.⁶ There are clear guidelines have been formulated by organizations such as World Health Organization (WHO), Federation of Obstetrics and Gynecological Society of India, and International Pregnancy Advisory Services (Ipas) India for patients and providers regarding the use of abortion pills. However, MAP are widely available over the counter, and its unsupervised consumption is rising day-by-day particularly in rural areas where access to abortion services and quality of treatment is poor.^{7,8}

The study evaluates magnitude and outcome of self-medication, it also gives a faint idea about factors prevailing leading these women to choose unsafe ways to terminate unwanted pregnancy in our scenario, so that it would help policy makers to formulate new strategies and strengthen existing health services.

MATERIALS AND METHODS

This study was a retrospective observational study carried out in the department of Obstetrics and Gynecology of Chhattisgarh Institute of Medical Sciences a Government Medical College and 2nd biggest tertiary care hospital, after due permission from the Ethical Committee of our Institution. All case records of 400 women with the diagnosis of unsafe medical abortion were analyzed between the periods of June 2009-May 2014 and data were collected from case sheets. Total 142 women were included for a study that had given a history of self-administration of MAP and admitted for complications such as severe vaginal bleeding, lower abdominal cramps, incomplete abortion, and for blood transfusion. By self-medication or self-administration, we mean that these pregnant women had no prior medical consultation and had taken MAP, which was purchased from the pharmacy without any prescription either by self or by some close relative. Each case was thoroughly evaluated and discussed on the basis of demography profile, gestational age at the time of termination, reason for termination, complaint, complication, examination findings, investigation reports, and management. The statistical analysis performed by SPSS version 21.0 and qualitative data were presented as frequencies and percentages.

RESULTS

The total number of unsafe abortions observed over a period of 5 years was 400 of which 142 (35.5%) women presented with a history of self-medication of MAP were included and thoroughly analyzed for the study.

Among total patients, 100 (70.4%) were married, 32 (22.5%) were separated or widow, and 10 (7.0%) women were unmarried. In our study, 96 (67.6%), 23 (16.2%), 22 (15.5%), and 1 (0.7%) were between 20 and 29 years, 30-39 years, <20 years, 40 years of age group, respectively. Majority 104 (73.2%) were educated, 81 (57%) from rural back ground, 133 (93.7%) were Hindu by religion, and 106 (74.6%) were from low socioeconomic status (Table 1).

Of the total 142 women, 40 (28.2%), 100 (70.4%), 2(1.4%) women were nulliparous, multiparous, and grand multipara, respectively. The majority of patients had taken MAP within 14 days before coming to our hospital. Duration of pregnancy at the time of abortion was <12 weeks in 104 (73.2%), 13-20 weeks in 31 (21.8%), and >20 weeks in 7 (4.9%) women (Table 2).

Majority 100 (70.4%) were admitted after self-medication for heavy vaginal bleeding, 21 (14.8%) for severe abdominal pain, 13 (9.2%) for ultrasonography (USG) diagnosed retained products for evacuation, and 8 (5.6%) for blood transfusion (Graph 1).

Table 1: Demographic details (n=142)

Variable	No.	%
Age in years		
<20	22	15.5
20-29	96	67.6
30-39	23	16.2
>40	1	0.7
Marital status		
Married	100	70.4
Unmarried	10	0.7
Separated or widow	32	22.5
Educational status		
Uneducated	38	26.8
Educated	104	73.2
Residence		
Rural	81	57
Urban	61	43
Religion		
Hindu	133	93.7
Muslim	9	6.3
Socioeconomic status		
Low	106	74.6
Middle	36	25.3

Table 2: Parity and gestational weeks (n=142)

Variable	No.	%
Parity		
0	40	28.2
1-3	100	70.4
4-6	2	1.4
Gestational weeks		
<12	104	73.2
13-20	31	21.8
≥21	7	4.9

Unintended pregnancy was the reason for abortion in majority of 124 (87.3%) cases, of which 36 (25.4%) for birth spacing, 35 (24.6%) were lactating or ignorant of being pregnant, 32 (22.5%) were divorce or widow, 18 (12.6%) had undergone abortion due to sex preference, 11 (7.7%) were unaware of any contraceptive methods, and rest of 10 (7.04%) were unmarried teenagers (Graph 2).

Major complications observed in 51 (35.9%) cases only, of which moderate to severe anemia seen in 42 (29.6%), shock in 5 (3.5%) drug failure in 3 (2.11%), and septicemia in 1 (0.7%) patient (Table 3).

The majority of 63 (44.3%) women required surgical evacuation, 31 (21.8%) required blood transfusion, and 1 (0.7%) patient required intensive care. Hysterotomy with tubectomy performed in 1 (0.7%) patient for the previous cesarean section with drug failure, while 46 (32.4%) patients were kept under observation only (Graph 3). Fortunately,

no mortality observed in our study and all patients discharged well after making them aware of post-abortion contraception.

DISCUSSION

All termination of pregnancy although a safe procedure in trained hands can produce disastrous outcome when performed by untrained and unauthorized people in improper settings.

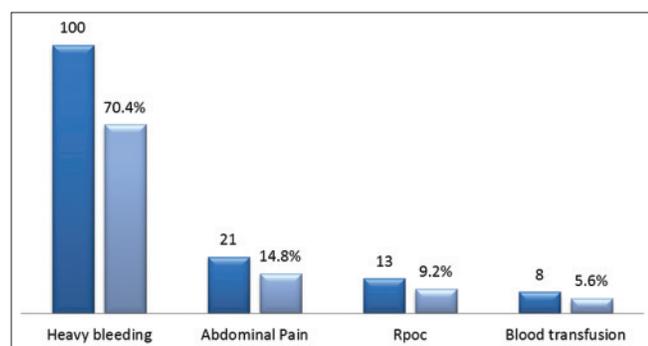
As per guidelines by Ipas India, commonly used drugs for Medical Methods of Abortion are a combination of mifepristone and misoprostol. Drug Controller General of India approved the use of mifepristone (in April 2002) and misoprostol (in December 2006) for termination of pregnancy up to 49 days gestation period, later on in December 2008, mifepristone + misoprostol (1 tablet of mifepristone 200 mg and 4 tablet of misoprostol 200 mcg each) combipack was approved by the Central Drugs Standard Control Organization, Directorate General of Health Services for the medical termination of intrauterine pregnancy (MTP) for up to 63 days gestation.

Obstetrician and Gynecologist, registered medical practitioner as defined by the MTP Act, can only prescribe the MAP to those patients, who are able to understand the instructions, ready for minimum three follow-up visits, ready for surgical procedure if required, having good family support and easy access to appropriate healthcare facility if needed. After counseling and history-taking, a pelvic examination is a must to confirm pregnancy and to rule out ectopic pregnancy or fibroid. Hemoglobin, urine examination, blood grouping, and Rh typing examination are recommended. USG examination is optional. The patient is asked to report immediately if excessive bleeding, pain, fainting, or any problem occurs after MAP intake.⁹

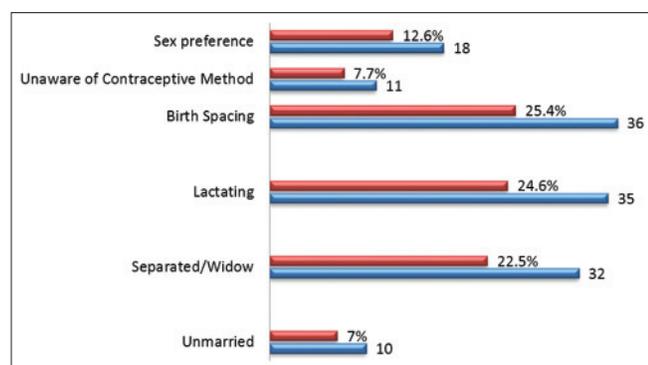
Table 3: Complications*

Complications	No.	%
Moderate to severe anemia	42	29.6
Shock	5	3.5
Failure	3	2.8
Septicemia	1	0.7
Total	51	35.9

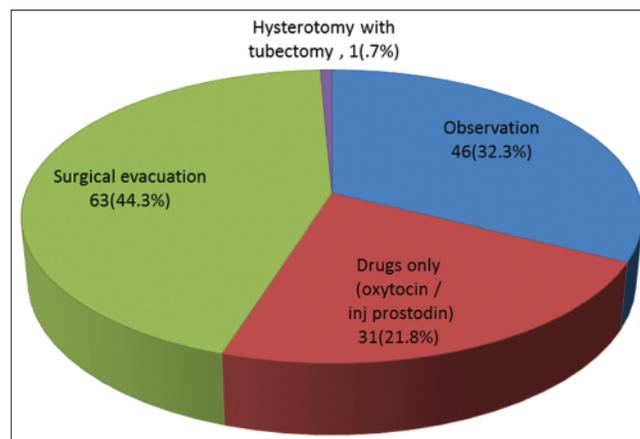
*More than one complication was present in some of the women



Graph 1: Complaints at admission



Graph 2: Reasons for seeking abortion



Graph 3: Management

In our study, 142 patients had self-administered MAP for abortion which accounts for 35.5% of total 400 unsafe abortions, and 18.4% of total 758 abortions observed in 5 years. The majority of women were between 20 and 29 years of age group, married, and sought the abortion in the first trimester, although women from all segment and of all age seek the abortion in India.^{7,10,11} Studies indicate that practice of self-induction is declining in general, though 1-10% adolescents, unmarried women, rural, and economically disadvantaged women still rely in these practices similar as our findings,^{10,12} where unmarried or separated or widow contributed 29.57%, out of which 15.5% were contributed by adolescents as girls in our state are generally married off at an early age.¹³ Unintended pregnancy was the major reason for termination 87.3% among the women in our study, suggests a high unmet need which is slightly higher 24.8% in our state than unmet need of India.¹⁴ Researchers have found that underlying reasons for abortion could be risk to women's health, contraceptive failure, pregnancies occurring soon after marriage or occurring outside of marriage, nonconsensual sex, and sexual violence which is more often observed in rural areas like in our state where about 30% of ever-married women have experienced spousal violence.^{12,14,15}

Abortion due to sex preference observed in 12.7% cases although no confirmatory evidence available at the time of admission indicates female feticide might be widely-practiced although unreported leading to continuous declining sex ratio at birth in our state.^{13,16}

The availability of MAP through chemists is widespread and well-documented, studies suggests that when faced with an unwanted pregnancy, many women in India choose to first attempt to terminate the pregnancy on their own, often using drugs purchased from a chemist without a prescription¹⁷⁻¹⁹ similar as our study where majority were educated, might be aware of medical pills, found it safer and convenient to conceal their termination.

The most frequent complains for admission was heavy vaginal bleeding and incomplete abortion in our study which could be due to higher gestation age, erratic drug schedule, or incomplete regimen. It has been found that serious complications such as bleeding, sepsis, and failure were reported more in women taking drug as self-medication than under a doctor's supervision.¹⁹⁻²¹ Hence, it appears that medical abortion highlights the need for vigilance and early access to medical help to control morbidity and mortality.²²

Shortcomings of Safe Abortion in Our Scenario

In Chhattisgarh, of 25.5 million population 78% live in rural areas, 37% account for tribal population where more than half

of 27 districts have been classified as remote areas despite that, percent of abortion is only 2.1% here (Census 2011-2012).

As per APIP 2012-2013, states 13 district hospitals and 46 community health centers have facilities to provide abortion services although these services are not at all properly utilized by most of the village people that could be because of lack of physical access to health services due to dense forest and infiltration of extremist groups in certain areas, high out of pocket expenditure incurred on travelling and purchasing medicines. One study highlights huge shortage of 11% medical doctors at PHCs and 50% at CHCs, severe deficiency of MTP trained providers, essential equipment's and medicines required for abortion, leaving an almost complete void of abortion facilities in rural areas of our state. In PHCs where medical doctor or clinician is not available, pharmacists and nurses usually provide care.^{23,24} Thus, majority of the population living in remote areas devoid of basic facilities sought abortion through unsafe ways such as self-medication or through pharmacists, nurses, or quacks.

People also avoid approaching government hospitals due to poor confidentiality offered and risk of being forced for sterilization or to use any form of contraception after abortion.²⁵

In some areas, private doctors have stopped offering abortion services altogether especially second-trimester services, out of fear that they will be prosecuted for providing sex-selective abortions, even if they are not knowingly doing so.²⁶

It has been seen that major decision regarding abortion and contraception are taken by husbands or mother-in-law in rural areas, indicate poor knowledge of couple about their reproductive rights and MTP law which says that the consent of the pregnant woman is required enough for termination of her pregnancy and in case of a minor, a written consent of the guardian is mandatory.

Apart from lack of awareness about legal abortion, knowledge and acceptance of all modern family planning methods is very low in women of state as compared to other EAG states, which can be attributed to improper counseling prior to abortion.²⁷

CONCLUSION

Overall, the quality of health care at PHCs and CHCs in our state is very poor in remote areas in addition lack of awareness about health compounds the problem. Thus effective measures required are: Improving the literacy rates, strengthening of existing infrastructure, organizing comprehensive abortion

care trainings or workshops for doctors to improve their working efficiency and skill, recruiting trained medical doctors especially lady medical officers and supporting staffs at each and every level to fill the gap, ensuring availability of required equipment's, and emergency drugs time to time. Attachment of lady counselor in tertiary health care centers just like HIV/STD counselor to help the patients. Free supply of MAP at CHCs, District Hospitals and Medical Colleges can reduce over the counter sale at some extent. Governmental and non-governmental collaborative efforts to promote awareness about contraceptives, abortion right, and safe abortion services by introducing new technology and legislation would be highly desirable. However, sample size of a present study done in a Medical College Hospital is small thus large-scale studies are required to assess the actual magnitude of this problem.

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Tuberculous Empyema Thoracis: Clinical, Bacteriological Features, and Its Medical Management

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Abstract

Background: Tuberculous (TB) empyema is a chronic infection of pleural space which carries a significant morbidity and mortality.

Aims: The aim of this study was to observe clinical, radiological, bacteriological features, and the outcomes obtained by the medical management of TB empyema.

Methodology: A retrospective case analysis of all the adult patients admitted with TB empyema was performed.

Results: Records of 100 patients with TB empyema showed that Cough, expectoration, and chest pain were present in 96%, 94%, and 64% patients, respectively. Direct smear of Pus and sputum showed *acid-fast bacilli* (AFB) in 57 and 46 patients, respectively, whereas 32 patients had smear positivity for both. Mycobacterial culture of pus was positive in 32/100 patients. The chest radiographs had moderate and far advanced parenchymal lesions in 37 patients each. The median duration of hospital stay was 57 (41-97) days. Eight patients were managed using closed needle aspiration, whereas in others intercostals drainage tube was inserted. About 47 patients were discharged after removal of the intercostal tube (ICD) tube, whereas 36 patients had residual empyema space, so was discharged with an open drainage tube. Eight patients died and four left the treatment against advice and 5 were referred for thoracic surgery.

Conclusion: Confirmation of diagnosis by presence of mycobacteria in pus and sputum sample and draining of empyema cavity using ICD tube or closed needle aspiration along with effective anti-tubercular drugs results in healing, and many patients may not requires surgery.

Key words: Antitubercular drugs, Drainage, Empyema tuberculous, Pleural cavity

INTRODUCTION

Empyema thoracis, defined as, a collection of pus in the pleural space, which is an anatomical space bordered by both the visceral and parietal pleura. Empyema is an illness with significant morbidity^{1,2} and mortality.^{3,4} Tuberculosis (TB) of the lung may also lead to formation of pleural

effusion or empyema. TB empyema is a chronic, active infection of the pleural space.

Clinical outcomes of TB empyema are generally believed to be worse compared to those of non-tubercular empyema, because of protracted illness, presence of concomitant fibrocavitary lesions, high bacillary load, development of bronchopleural fistulae (BPF), and requirement for complicated surgeries in face of compromised lung function.⁵ Anti-TB drug treatment alone cannot cure the patients with tubercular empyema and almost all cases require some form of external drainage of pleural pus. The secondary infection of this pus by other pyogenic infections may add to the severity of illness that may prolong the time to cure the illness, as well as increases

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the cost of treatment, in the form of antibiotics that may be required to treat this infection.

In this study, our objectives were to present the clinical features, bacteriological features and to review our experience with mainly medical management (requiring Intercostal drainage or aspiration of pus as only minor surgical procedures) of tubercular empyema by presenting the outcomes.

METHODOLOGY

Study Design

A retrospective case analysis of all adult TB empyema cases admitted at a tertiary care institute for TB and pulmonary diseases from March 2011 to March 2012 was done for the study.

Patient's Population

The patients of empyema suffering from TB confirmed either by, presence of acid-fast bacilli (AFB) in sputum or pus samples, or radiological chest X-ray findings suggestive of TB or diagnosed as TB on clinical grounds in absence of any evidence of TB bacteriologically and radiologically were taken, as cases, for the purpose of study.

Exclusion Criteria

Patients of age younger than 13 years and those with empyema due to other causes were excluded from the study.

Study Procedure

The case files of tubercular empyema patients admitted were reviewed retrospectively. Data with respect to clinical profile, bacteriological status, radiological aspect, and outcomes were recorded. By reviewing the case history recorded in the case file, the presence of cardinal symptoms of chest disease (i.e. cough, expectoration, breathlessness, chest pain, and hemoptysis) and their duration was recorded. Patients reporting constitutional symptoms such as fever, weight loss, and loss of appetite were also recorded. Any associated condition which may cause immunosuppression such as HIV infection or history of intake of corticosteroids for long periods was also recorded. Past history of TB and the treatment received by the patient for it was obtained from case file. As part of the management of these patients, their samples of sputum, and pus is sent for microbiological investigations for the presence of AFB in direct smear in sputum and direct smear and mycobacterial culture in pus sample. The reports of these investigations were recorded for the purpose of the study. The detection of presence of any pyogenic bacteria in aerobic cultures of pus specimen from pleural cavity was also noted for every case. Patients having small volumes of pus (<200 ml) estimated by

ultrasound and without any evidence of bronchopleural fistula (absence of air fluid level) on chest radiograph were managed by therapeutic pus aspiration by closed needle as per the empyema management protocol of the institute. Those with massive pleural collections and presence of bronchopleural fistula were managed by intercostal drainage of pus by tube thoracostomy with underwater seal, by inserting a intercostal tube (ICD) of size 20-32 F, depending on the patient's clinical situation. No negative suction device was applied to ICD during treatment, and the ICD tube was changed every week. By reviewing the case notes, the type of treatment, and length of stay in hospital and outcome of patients were recorded. The anti-TB treatment was given as per Revised National TB Program of India,⁶ under direct supervision of ward nurse to the patients. Patients categorized as newly diagnosed TB were given alternate day regimen with isoniazid, rifampicin, pyrazinamide and ethambutol during intensive phase and rifampicin and isoniazid during continuation phase. The re-treatment category patients received injection streptomycin in addition to the above drugs in Intensive phase. Those with documented secondary infection in pus were given 3 weeks of antibiotics also in addition to anti-tubercular drugs as per the sensitivity testing report. Outcomes of patients were recorded as any one of the following such as patient discharged after successful aspiration of pus by closed needle technique or removing ICD tube and sealing the ICD site, Discharge after removing under water seal drainage and putting small open drainage tube, patients referred for surgery for empyema, death and left against medical advice (LAMA).

The post ICD tube drainage or post closed needle aspiration chest X-ray was considered for evaluation of the parenchymal lesions in tubercular empyema patients. The disease extent radiologically was graded as per the classification of the National TB Association of the USA⁷ which grades TB lesions as:

- Minimal
- Moderately advanced
- Far advanced.

The study was approved by the Institutional Ethics Committee. Informed consent of patients was not recorded as the study was retrospective in nature, done by reviewing only the medical records of patients.

Statistical Analysis

The above information from the performa was tabulated in a Microsoft excel sheet and data analyzed for frequencies and distribution by using statistical software SPSS version 13 (SPSS inc., Chicago, IL) on a personal computer. The results obtained were tested for normality distribution. Intergroup analysis was done by using Chi-square test,

independent *t*-test, Mann–Whitney test or Kruskal–Wallis test as appropriate for the data. The values which were not normally distributed were written as median with inter quartile range. The relationship between two parameters was evaluated by using Pearson correlation coefficient or Spearman rank correlation coefficient, if they were appropriate. The level of significance was set at $P < 0.05$.

RESULTS

One hundred patients of tubercular Empyema were admitted during the study period. Male preponderance was observed in the study group, in which 83 male patients and 17 female patients were enrolled for the study.

The mean age of patients was 31.1 ± 13 years (ranging from 13 to 70 years) with the majority of them belonging to younger age group 15-30 years. General characteristics of the study group and the presence of co-morbid conditions are shown in Table 1.

The majority of patients were chest symptomatics with complaints pertaining to respiratory system such as cough, expectoration, chest pain, and breathlessness. A cough was complained by 96 patients, amongst them 44 had chronic cough of more than 2 months duration. Most of the tubercular Empyema patients also had expectoration with the cough (94%). Chest pain and shortness of breath was present in 64% and 84% patients. Only ten patients had complaint of hemoptysis. 95 patients reported fever, 90 had loss of appetite and 84 had history of significant weight loss.

In this study, it was seen that 53 patients had no past history of intake of anti-tubercular drugs, and 47 patients had reported intake of anti-tubercular treatment for at least 1 month in past. Accordingly, when patients were categorized as per the Revised National TB Control Program (RNTCP) guidelines,⁶ it was found that 53 patients belonged to new, 18 to treatment after default, eight relapse, six failure and 15 to others category. The Mantoux test was done for 62 patients, in which 43 were tuberculin test positive and 19 were tuberculin negative. When the Mantoux test was studied in relation to sputum and Pus for AFB positivity, it was found that 23 patients with Mantoux test positive were sputum positive and 20 were sputum negative. Eight patient each was Mantoux negative, but were sputum positive and Pus culture positive. About 15 patients with pus culture positive were Mantoux positive and 29 were Mantoux positive but Pus culture negative.

Bacteriological Aspect

Among the patients under study, sputum smear for AFB was positive in 46/100 patients. As per WHO classification

of sputum smear⁸ which is based on bacteriological load, it was seen that majority of patients were 1+ (21/46), next common was 3+ (17/46), followed by 2+ (6/46), and scanty +ve (2/46), in that order. The study of AFB in pus smears in patients of tubercular Empyema showed that 57/100 were AFB direct smear positive, with majority having 1+ bacteriological load (25/57), 16/57 were 2+, 10/57 as scanty +ve, and 6/57 were 3+ positive and 43 were reported as smear negative in pus.

Pus sample mycobacterial cultures grew AFB in only 32/100, while 64 samples were reported negative and four samples got contaminated in the process of culture.

When the patients were studied in correlation with sputum smear and pus smear for AFB positivity, it was found that 40/100 patients were positive for AFB in both sputum and pus samples. The results of these correlations are shown in Table 2

Among patients whose pus smear was positive (57/100), 33 reported to be culture negative, whereas eight patients had direct smear negative, but culture had evidence of growth of AFB in pus. In studying the coinfection of pus samples with pyogenic aerobic bacteria's, it was found that 36/100 had documented secondary infection, where as in 64/100 the culture for pyogenic bacteria's was sterile.

Radiological Findings

As per the grading system of Chest X-ray, it was found that 28 patients had mild lesions in lung parenchyma, 37 were graded as moderate and 37 as far advanced, as described

Table 1: General characteristics and co-morbid conditions

Parameter	Value
Age (in years)	31.1±13
Sex ratio (male:female)	4.88 (≈5:1)
BMI in Kg/m ²	16.2±3.2
ATT history (n=100)	47/100
Sputum smear AFB positive (n=100)	46/100
Mantoux test positive (n=62)	43/62
Secondary infection (n=100)	36/100
HIV (n=100)	4/100
DM (n=100)	5/100
On long term steroids (n=100)	1/100

BMI: Body mass index, ATT: Antithrombotic trialists, DM: Diabetes mellitus, AFB: Acid fast bacilli

Table 2: AFB smears status

AFB smear status	Number (n=100)
Sputum +ve, Pus +ve	40
Sputum +ve, Pus -ve	6
Sputum -ve, Pus +ve	17
Sputum -ve, Pus -ve	37

AFB: Acid fast bacilli, +ve: Positive, -ve: Negative

in Table 3. The severity of lung parenchyma involvement on chest radiograph did not had any significant difference in duration of stay or favorable outcomes ($P > 0.05$).

Treatment Outcomes

The median duration of stay was 57 days (41-97 days) for the study group. The median duration of stay in sputum smear negative patients was 42 days (range 33-56 days) and it was significantly lower than those patients who were sputum smear positive for AFB (Median-98.5 days; $P < 0.001$). Duration of stay positively correlated moderately with sputum smear positivity ($r = 0.640$; $P = 0.003$) and weakly with Pus smear ($r = 0.213$; $P = 0.03$) and pus culture positivity ($r = 0.216$; $P = 0.03$). Duration of stay was also seen to be more in patients who had documented secondary infection in pus ($r = 0.261$; $P = 0.009$). The duration of stay did not correlated with any presenting symptoms significantly.

Among the 100 patients of tubercular empyema, 47 were discharged after satisfactory lung expansion, whereas 36 patients had persistent empyema space (incomplete lung expansion), but very minimal or no pus discharge, so open drainage procedure was done in them and discharged from hospital with an advice to attend a special clinics organized once in a weeks.

Eight patients succumbed to their illness. In the study, four patients had decided to quit the treatment against medical advice, so their outcome was recorded as LAMA. Those patients who had pus discharge of more than 100 ml each day through ICD even after completion of an intensive phase of anti-tubercular treatment were referred to other center with thoracic surgery facilities for thoracic surgeons opinion. Five patients were found suitable for thoracic surgery and hence were referred to that center for surgeries and their further progress was not known, so their outcome has been recorded as “referred for thoracic surgery” (Table 4). For the purpose of statistical analysis the outcomes discharged after treatment and open drainage were clubbed as “favorable outcome” and death referred for thoracic surgery and LAMA were clubbed into “not favorable” outcomes. It was found that outcomes correlated weakly with duration of stay ($r = -0.316$; $P = 0.001$) and with age ($r = 0.334$; $P = 0.001$). The outcomes did not correlate with sputum smear or pus smear positivity and Pus culture positivity for AFB (Table 5).

DISCUSSION

TB is a common cause of empyema in countries like India where prevalence of TB is high,⁹ whereas in developed countries post pneumonic and post surgical etiology is

Table 3: X-ray status

X-ray grade	Number of patients (n=100)
No lesion	4
Mild	28
Moderate	37
Far advanced	31

Table 4: Outcomes of patients after minimally invasive treatment approach

Outcomes	Numbers
Discharged after treatment	47
Discharged on open drainage	36
Death	8
LAMA	4
Referred for thoracic surgery	5

LAMA: Left against medical advice

Table 5: Outcomes and its relation with pus smear results

Outcome	Pus smear positive (n=57) (%)	Pus smear negative (n=43) (%)
Discharged after treatment (n=47)	27 (47.3)	20 (46.5)
Discharged on open drainage (n=36)	21 (36.8)	15 (34.8)
Death (n=8)	2 (3.5)	6 (13.9)
LAMA (n=4)	2 (3.5)	2 (4.6)
Referred for thoracic surgery	5 (8.7)	0 (0)

LAMA: Left against medical advice

more common in patients with empyema.¹⁰ TB has been found to be the cause of empyema in approximately 65% of cases in studies reported from high prevalence regions of the world.^{9,11,12}

TB affects the patients commonly in their productive age (21-40 years). In our study also the mean age was 31.1 years, and majority belonged to age group 21-40 years, which was similar to findings in earlier studies.¹¹⁻¹⁴ The studies done in western countries reported the usual age of patients with empyema as 40-50 years, where the etiology of empyema was usually post-pneumonic and post-surgical.^{15,16}

The symptoms in patients of tubercular empyema are similar to that reported by patients of pulmonary TB. Many patients have cough with expectoration and fever (95% cases in our study). Tubercular as well as non-tubercular empyema patients report cough and fever, but these symptoms are present for a longer duration in tubercular patients, prior to their visit to health facility.^{12,14,17} Our study also shows that, as many as 40-45% patients had symptoms of cough, expectoration and fever of more than 2 months duration. Expectoration of blood with sputum was reported by only 10% of patients, although 46% of the patients under study were suffering from

sputum positive pulmonary TB also and studies in past have shown that hemoptysis occurs in 21-27% of patients with pulmonary TB.

Pleural fluid studies of empyema patients have shown high AFB positivity. The pleural fluid (pus) AFB positivity in our study was 57%, which is almost similar to studies done by Kundu *et al.*¹⁸ and Goyal *et al.*,¹² who had found AFB positivity of 71.6% and 50%, respectively. The yield of this test can be increased if a standardized methodology is followed for AFB staining and reporting. In our study, pleural pus direct smear and culture for AFB was done in an intermediate reference lab accredited under RNTCP. Hence, testing of pleural fluid for AFB in a reliable lab may help in actually confirming tubercular etiology rather than the other etiologies of pleural pus in most of the cases. The pus in the pleural cavity may get co infected with secondary bacterial infection through a persistent BPF, but the yield of bacterial culture of pleural fluid in empyema is low with conventional laboratory methods.^{19,20} In our study only 36% patients had documented secondary infection in pus culture.

Therapy for tubercular empyema consists of prompt drainage of infected pleural space, effective anti-tubercular treatment regimen and treatment of associated secondary infection of pleural space.¹⁵ Treatment of these tubercular empyema patients with intercostal drainage for a prolonged period (median 57 days) has resulted in successfully discharging 47 out of 100 patients. Some patients of empyema without bronchopleural fistula can also be managed by closed needle aspirations.¹⁵ Kamat *et al.* had reported shorter duration of hospital stay of 7.9 weeks (55 days) of patients suffering from pyogenic empyema as compared to 12.2 weeks (85 days) in patients with tubercular empyema,¹⁸ similarly, a study done on tubercular empyema patients had shown that majority of cases had duration of stay of 2-4 months.²¹

In our study, it is seen that duration of stay was longer in patients with smear positive for AFB as compared to smear negative. The time taken for the treatment response also depends upon the presence of secondary bacterial infection in pus, as is seen from results in our study in which the duration of stay correlated with the presence of secondary infection.

Discharging patients with persistent empyema space on open drainage, whose lung does not expand further due to formation of adhesions with thickened pleura is an advantageous method of managing an empyema patient conservatively. In the majority of cases simple procedure of chronic open drainage not only allows these debilitated patients to gain independence from tubing's and bottles,

but may also allow a freedom in rehabilitative activities such as doing some lighter kind of jobs as their occupations. In our study, it has been seen that 36 out of 100 patients were discharged on open drainage with advice of regular follow-up visits.

Subjecting all patients to thoracic surgery procedures, the type of surgical procedure and timing of empyema patients to these surgeries remains a matter of debate. Sonmezoglu *et al.*²² in their study have found open drainage better than Eloesser flap and pneumonectomy, in terms of morbidity and complication rates and recommended that these procedures should be avoided wherever possible, where as many studies now recommend performing thoracic surgeries such as video assisted thoracoscopy earlier in cases of empyema. So, it is still not clear whether these surgical procedures should bypass simple medical thoracostomies in all cases of empyema.^{23,24} Ashbaugh reports, decortication is more effective than open drainage in reducing morbidity and mortality when surgical intervention is necessary.¹⁶

In countries such as ours, with limited thoracic surgical facilities and expertise available, it becomes difficult to subject every patient of tubercular empyema with persistent empyema cavity to major thoracic surgical procedure and many times TB patients are chronically ill and therefore, too debilitated (as in our study with mean body mass index of patient only 16.2 kg/m²), so that the general condition of these patients may not permit performing these procedures upon them. A Large number of tubercular empyema patients may not be suitable candidates for surgical therapy also because of involvement of both or the contra lateral lung with TB. Furthermore, the arguments made in favor of subjecting patients early to surgical therapy by shortening the medical management of empyema were based on studies mostly done on patients suffering from parapneumonic effusions, where the empyema is usually acute and also does not carry the extent of morbidity as in tubercular empyema.²⁵⁻²⁸ So, performing studies on tubercular empyema patients for demonstrating benefits of early surgical procedures is needed, such that recommendations on subjecting the patient for surgical therapy may be made.

The mortality from empyema ranges from 11% to 50%.^{12,17} In our study, we had 8% mortality. Many patients are unable to tolerate prolonged treatment required along with the discomfort of chest tubes in situ, hence may decide to leave the treatment, as shown in our study (4%). It was found in a study, that majority of patients decided to quit treatment from the same center after 2.5 months of treatment.¹⁷ In our study, we found that the median duration of stay for patients who had LAMA was 25.5 days.

CONCLUSION

It can be concluded from the above study that, all patients of tubercular empyema have chronic morbidity and may require hospitalization. Closed intercostals drainage is an effective method of draining empyema cavity, therefore resulting in early healing when an effective anti-tubercular treatment regimen is also given in these patients. Many patient of tubercular empyema may not require surgery, but the most important aspect remains to be proper diagnosis of TB as cause of empyema, which can be best confirmed by presence of TB bacteria in pus and sputum samples.

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Morbidity Pattern and Hospital Outcome of Neonates Admitted in a Tertiary Care Teaching Hospital, Mandya

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Abstract

Introduction: Neonatal period is a very vulnerable period of life due to many problems. India alone contributes to about 25% of neonatal mortality around the world. In spite of advances in perinatal and neonatal care, neonatal mortality is still high in developing countries. This study was undertaken to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital, Mandya.

Study Design: Retrospective study of medical records for 1 year (January 2014-December 2014).

Materials and Methods: Neonates admitted to NICU, Mandya Institute of Medical Sciences, Mandya during the study period were included in the study; the data were recorded in predesigned proforma. The data were analyzed using appropriate statistical tool.

Results: A total of 1487 neonates were admitted to NICU during the study period, 54 neonates left against medical advice, 79 were referred to other centers hence excluded from analysis. The ratio of the males to female admitted was 1.45:1. The major causes of morbidity were neonatal sepsis (28.8%), respiratory distress syndrome (RDS) (23.85%), birth asphyxia (17.72%), neonatal jaundice (7.02%), and meconium aspiration syndrome (5.47%). In this study, overall mortality rate was 7.16%. Most of the deaths were due to RDS (43.3%), birth asphyxia (37.11%), neonatal sepsis (8.25%), and congenital anomalies (8.25%). Neonates with birth weight <1500 g had poor outcome compared to neonates with birth weight more than 2500 g.

Conclusion: This study identified prematurity, low birth weight, neonatal sepsis, and birth asphyxia as major causes of morbidity and RDS, birth asphyxia as the major contributors to the neonatal mortality. Improving antenatal care, maternal health and timely referral of high risk cases to tertiary care hospital will help to improve neonatal outcome.

Key words: Birth asphyxia, Neonatal morbidity, Neonatal mortality, Neonatal sepsis

INTRODUCTION

The neonatal period is a very vulnerable period of life due to many problems, which in most of the cases is preventable.^{1,2} Of the 25 million babies born in India every year 1 million die, India alone contributes to 25% of neonatal mortality around the world. As per the National Family Health

Survey-3 report, current neonatal mortality rate (NMR) in India is 39 per 1000 live births, neonatal deaths accounts for nearly 77% of all infant deaths (57/1000) and nearly half of under-five child deaths (74/1000).³ Preterm and low birth weight (LBW) babies are at increased risk of perinatal mortality and morbidity.⁴ As per the report sheet published in the Lancet, the major direct causes of neonatal mortality are pre-term birth (27%), infection (26%), asphyxia (23%), congenital anomalies (7%), others (7%), tetanus (7%), and diarrhoea (3%).⁵ There are very scanty data which are available regarding the neonatal mortality and morbidity pattern in India. Advancement in perinatal and neonatal care have significantly helped in reducing NMR in developed countries, but the mortality and morbidity are still high in developing countries.⁶ To

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apply preventive strategies, we should have the data on morbidities which are claiming the neonatal life. This study was undertaken to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital located in Mandya, Karnataka, India.

MATERIALS AND METHODS

This hospital based retrospective study was carried out in the NICU, Department of Pediatrics, at Mandya Institute of Medical Sciences, Mandya, Karnataka, India, for a period of 1 year from January 2014 to December 2014. The Institutional Ethical Committee approved the study protocol. Our NICU caters to the population of Mandya district and neighboring district of Ramnagara. Approximately 6000 deliveries are conducted per year in the hospital; the majority of patients belong to below poverty line income group. Our NICU has bed strength of 17, facility for phototherapy, surfactant administration, exchange transfusion, and ventilation are available.

A retrospective case record review and analysis of all the newborn babies admitted to the NICU during the study period was done and neonates satisfying inclusion and exclusion criteria were included in the study.

Inclusion Criteria

All neonates admitted to NICU.

Exclusion Criteria

Neonates who left hospital against medical advice (LAMA) and neonates who were referred due to non-availability of beds and surgical intervention were excluded from the study.

These neonates were categorized as inborn if delivered in the Medical college Hospital and as outborn if born outside. The data were recorded in predesigned Proforma.

Statistics

Data collected were compiled and entered in MS Excel spreadsheet and analyzed using appropriate statistical tools in Open Epi statistical software, version 2.3.1.

RESULTS

A total number of babies admitted to NICU during the study period was 1487 of which 54 neonates LAMA and 79 neonates were referred to other centers hence these neonates were excluded from the study. A total of 1354 neonates were included for the data analysis. Out of this

59.23% (802) were male and 40.77% (552) were females, ratio is 1.45:1. Of the total admissions 71.71% (971) were inborn neonates and 28.29% (383) were outborn neonates (Table 1). 52.21% (707/1354) neonates had birth weight >2500 g, 40.55% (549/1354) of neonates belonged to LBW category (1500-2499 g), 6.06% (82/1354) of neonates belonged to very LBW (VLBW) group (1499-1000 g), 1.18% (16/1354) of neonates were of extremely LBW (ELBW) category (<1000 g). On applying one sample Chi-square test to see the observed frequency distribution in males and females neonates overall admitted to NICU, it was found to be statistically significant ($P < 0.001$).

The major causes of the morbidity for admission to NICU were neonatal sepsis (28.8%), respiratory distress syndrome (RDS) (23.85%), hypoxic ischemic encephalopathy (17.72%), neonatal jaundice (7.02%) and meconium aspiration syndrome (5.47%) (Table 2).

In this study, overall NICU mortality rate was 7.16% (97/1354). The mortality rate in inborn neonates was 6.69% (65/971) whereas mortality rate in outborn neonates was 8.36% (32/383), the difference in mortality rate between inborn and outborn neonates was statistically insignificant ($P = 0.284$). The mortality in males was 6.86% (55/802), in females was 7.61% (42/552), the difference in the mortality rate among male and female neonates was statistically insignificant ($P = 0.596$). The major causes for mortality were RDS (43.4%), hypoxic ischemic encephalopathy (37.11%), and neonatal sepsis (8.25%) (Table 3).

Table 1: Sex distribution of admitted neonates

Sex	Inborn (%)	Outborn (%)	Total (%)
Male	573 (59.01)	229 (59.79)	802 (59.23)
Female	398 (40.99)	154 (40.21)	552 (40.77)
Total admission	971 (71.71)	383 (28.29)	1354 (100)

Table 2: Morbidity profile of neonates admitted to NICU

Morbidity profile	Inborn (%)	Outborn (%)	Total (%)
Respiratory distress syndrome	227 (23.38)	96 (25.07)	323 (23.85)
Meconium aspiration syndrome	47 (4.84)	27 (7.05)	74 (5.47)
Respiratory distress (other causes)	31 (3.19)	11 (2.87)	42 (3.1)
Hypoxic ischemic encephalopathy	176 (18.13)	64 (16.71)	240 (17.72)
Sepsis/pneumonia/meningitis	285 (29.35)	105 (27.42)	390 (28.8)
Neonatal jaundice	65 (6.69)	30 (7.83)	95 (7.02)
Congenital anomaly	48 (4.94)	10 (2.61)	58 (4.29)
Intrauterine growth restriction	51 (5.25)	21 (5.48)	72 (5.32)
Hypothermia	12 (1.24)	9 (2.35)	21 (1.55)
Hypoglycemia	6 (0.62)	7 (1.83)	13 (0.96)
Others	23 (2.37)	3 (0.78)	26 (1.92)
Total	971 (100)	383 (100)	1354 (100)

NICU: Neonatal intensive care unit

On comparing survival among different birth weight groups (Table 4), it was seen that there was statistically significant difference between VLBW and normal birth weight group ($P \leq 0.05$), and between ELBW and normal birth weight group ($P \leq 0.05$). However, there was no statistically significant difference in survival among LBW and normal birth weight group ($P = 0.368$).

It was observed that the duration of time between admission and death was <1 day in 42.27% of deaths (41/92) followed by 1-3 days in 40.21% of deaths (39/97).

DISCUSSION

This study was conducted to delineate the morbidity pattern, outcome and factors leading to mortality of neonates admitted to NICU of tertiary care teaching hospital. Precise data regarding mortality and morbidity pattern for NICU admission are useful for many reasons.

In our study, total of 1354 neonates were admitted of which 71.71% neonates were inborn and rest were outborn babies (28.29%), male preponderance of admission to NICU was noted similar admission pattern has been seen in study conducted by Roy *et al.*⁷ 47.79% of neonates admitted had LBW and 28.58% of neonates admitted were preterm baby. This may probably be due to poor maternal health condition, low socio-economic status and less visits to health care facility. Similar rate of LBW and preterm baby admission has been reported by study conducted

by Garg *et al.* in New Delhi.⁸ According to the UNICEF "The state of the World's Children 2010" report, 28% neonates are born with LBW in India.⁹ The most common specific morbidity for admission was neonatal sepsis (28.8%) followed by RDS (23.85%) and hypoxic ischemic encephalopathy (17.72%). A study conducted by Gaucham *et al.* in Nepal reported that neonatal jaundice, sepsis and perinatal asphyxia as being commonest indication for admission to NICU.¹⁰ According to national neonatal-perinatal database (NNPD) sepsis (36%) is the most common morbidity responsible for admission followed by prematurity (26.5%) and perinatal asphyxia (10%).¹¹ Birth asphyxia is an important cause of neonatal morbidity and mortality, its incidence in our study is 17.72% which is similar to findings of Chandra *et al.*¹² Neonatal sepsis acts as an important cause for morbidity and mortality especially among LBW and preterm babies.

Mortality rate observed in our study is 7.16% is lower than that of the mortality rates observed in study conducted by Rakholia *et al.*¹³ The most common causes of mortality were RDS (43.3%), birth asphyxia (37.11%), and sepsis (8.25%). Similar pattern of outcome has been reported by study conducted by Rashid *et al.*¹⁴ In contrast the study report published by ICMR reports sepsis (32.8%) as the major cause for neonatal mortality followed by birth asphyxia (22.3%) and prematurity (16.8%).¹⁵ In the study done at JIPMER, sepsis was the cause for death in 52.3% of neonates followed by birth asphyxia and injuries (29.23%).¹⁶ Majority of deaths in our study was attributable to RDS and birth asphyxia; this may probably be due to poor antenatal care, malnourished pregnant women, less availability of health facility, delivery by untrained professional and delay in referral from peripheral hospitals. Birth weight <1500 g were associated with high number of mortality in preterm neonates.

CONCLUSION

According to this study neonatal sepsis, RDS and birth asphyxia are leading causes of morbidities in newborn babies. In spite of many advances in neonatal care above factors still continue to be the leading causes of morbidity in neonates. Common causes of neonatal mortality were RDS, birth asphyxia, neonatal sepsis and congenital anomalies. The majority of morbidities and subsequently the mortalities can be prevented by improving antenatal care, maternal health, timely intervention, referring at appropriate time to tertiary care centers for high risk cases, preventing preterm deliveries and care of neonates at centers with facility. This study has some limitations, as this was a hospital based retrospective study, the cause of death was determined using the data available in case

Table 3: Comparison of deaths among inborn and outborn neonates

Cause of neonatal death	Inborn (%)	Outborn (%)	Total (%)
Respiratory distress syndrome	26 (40)	16 (50)	42 (43.3)
Sepsis/meningitis/pneumonia	6 (9.23)	2 (6.25)	8 (8.25)
Meconium aspiration syndrome	2 (3.08)	1 (3.13)	3 (3.09)
Hypoxic ischemic encephalopathy (birth asphyxia)	25 (38.46)	11 (34.37)	36 (37.11)
Congenital anomaly	6 (9.23)	2 (6.25)	8 (8.25)
Total	65 (100)	32 (100)	97 (100)

Table 4: NICU outcome in different birth weight group

Birth weight	NICU admission (%)	Deaths (%)	Percentage of death is each group (%)
More than 2500 g	707 (52.21)	32 (32.99)	4.53
LBW (1500-2499 g)	549 (40.55)	31 (31.96)	5.65
VLBW (1000-1499 g)	82 (6.06)	22 (22.68)	26.83
ELBW (<1000 g)	16 (1.18)	12 (12.37)	75
Total	1354 (100)	97 (100)	-

NICU: Neonatal intensive care unit, LBW: Low birth weight, VLBW: Very low birth weight, ELBW: Extremely low birth weight

record sheets, Neonates who LAMA and those who were referred to other centers due to non-availability of NICU beds and needed surgical intervention were excluded from study and could hence modify the results. In our study, we did not divide the deaths into early and late neonatal period. As the majority of the patients presenting to us belong to low socio-economic status, the results from this study cannot be a complete reflection of the problem in the community as a whole.

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Histopathological Spectrum of Central Nervous System Tumors: A Single Centre Study of 100 Cases

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Abstract

Introduction: Central nervous system (CNS) tumors are not frequent tumors with primary malignant brain tumors accounting for 2% of all cancers in the U.S adults. The incidence rates are lower in developing countries like compared to the developed countries while increased rates have been observed in both.

Purpose: The aim of the present study is to study the histopathological spectrum of CNS tumors irrespective of age in single tertiary care center.

Material and Methods: The present 5 years study from a single tertiary care center, patient clinically diagnosed with CNS tumors and registered between 2009 and 2014 in pathology department were included and classified according to WHO 2007 classification along with grading of the tumor.

Results: A wide range of histopathological spectrum of CNS tumors was observed and was classified according to the recent WHO classification system. The primary CNS tumors were graded from Grade 1 to Grade 1V. Overall tumors of neuroepithelial tissue (51.7%) was the most common entity followed by the tumors of meninges (34.8%), metastatic tumors (5.6%), tumors of peripheral nerves (4.5%), tumors of the sellar region (2.3%), and lymphomas and hematopoietic neoplasm (1.1%).

Conclusion: Rising global trends in the incidence of CNS tumors, irrespective of age have been observed. The present study highlights the histological diversity in CNS tumors in both, adult as well as pediatric age groups.

Key words: Astrocytoma, Central nervous system, Meningioma, Tumors

INTRODUCTION

Though central nervous system (CNS) tumors are not as frequent as tumors of many other sites,¹ they showed a varied histopathologic spectrum. It has been revealed by International Agency for Research on Cancer that the worldwide incidence rate of CNS tumors in 2002 was 3.7/100,000 population among males and 2.6/100,000 population among females. The incidence rates were higher in developed countries (males:5.8/100,000; females:4.1/100,000) than in developing countries

(males:3.0/100,000; females:2.1/100,000).² In 2008, the rates had risen to 3.8/100,000 in males and 3.1/100,000 in females, although the incidence rates in developed countries (males:5.8/100,000; females:4.4/100,000) still remained higher than those in developing countries (males: 3.2/100,000; females: 2.8/100,000).

In developing countries like India, due to lack of complete registration of newly diagnosed cases with local cancer registries, the exact tumor burden of such disease goes unnoticed and is underestimated. Hospital-based prevalence data, therefore, forms the basis for estimating the disease load. With increased availability of diagnostic facilities and better healthcare, the incidence of CNS tumors seems to be on the rise in developing countries.³

All the CNS tumors were divided into seven categories: Tumors of neuroepithelial tissue; tumors of the cranial and paraspinal nerves; tumors of the meninges; lymphomas

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and hematopoietic neoplasms; germ cell tumors; tumors of the sellar region; and metastatic tumors. The WHO classification offers a crude histological grading system, in which each CNS tumor is classified as Grades I-IV according to its degree of malignancy. This system can provide an estimate for the prognosis of a patient. In this study, age, sex and the histological tumor type and grade were systematically recorded.

The spectra of the malignant tumors were different in the pediatric and adult groups. For the adults, astrocytic tumors, tumors of meninges, and metastatic tumors occupied the top three places while astrocytic tumors took the lead in pediatric cases.

MATERIALS AND METHODS

The present 5 years study from a single tertiary care center, the patient diagnosed with CNS tumors and registered between 2009 and 2014 in the pathology department were consecutively screened. The H and E stained histopathological slides of biopsy received were evaluated. The cases were diagnosed and characterized where necessary using immunohistochemistry and categorized according to the WHO 2007 classification. The inclusion criteria were cases of CNS tumors of all age groups. The tumors of peripheral nervous system and non-neoplastic conditions of the CNS were excluded. With these criteria, a total of 100 cases of CNS tumors were studied, and their histological typing and grading was done.

RESULTS

The present study was conducted during 2009-2014 in which 100 cases of clinically diagnosed CNS tumors received in the department of pathology were studied. Out of the 100 clinically diagnosed CNS tumors, neoplasm was seen in 89% of the cases and 07% showed reactive gliosis while biopsy was inadequate or inconclusive in 04%. Among the CNS tumors, the majority (95.5%) presented as space occupying lesion in the brain and only 4.5% were intra-spinal tumors. The CNS tumors showed a slight male predominance (Male: Female = 1.2:1) and a broad range was found, i.e. 0-70 years with the mean age of 40. The pediatric tumors contributed 12.3% of all CNS tumors (Table 1).

A wide range of histopathological spectrum of CNS tumors was observed and was classified according to the recent WHO classification system. The primary CNS tumors were graded from I to IV. Overall tumors of neuroepithelial tissue (51.7%) was the most common entity followed by the tumors of meninges (34.8%), metastatic

tumors (5.6%), tumors of peripheral nerves (4.5%), tumors of the seller region (2.3%), and hemolymphoid neoplasm (1.1%)(Figure 1) respectively (Table 2).

The tumors of neuroepithelial tissue comprised mainly of astrocytic tumors (39.32%) followed by oligodendroglial tumors (4.50%), (Figure 2) mixed gliomas (2.25%), ependymal tumors (2.25%), choroid plexus tumors (2.25%), and embryonal tumors (1.12%). Male predominance was seen in the ratio of 1.8:1.0 and the mean age was found to be 36.4 years. Among the astrocytic tumors, anaplastic

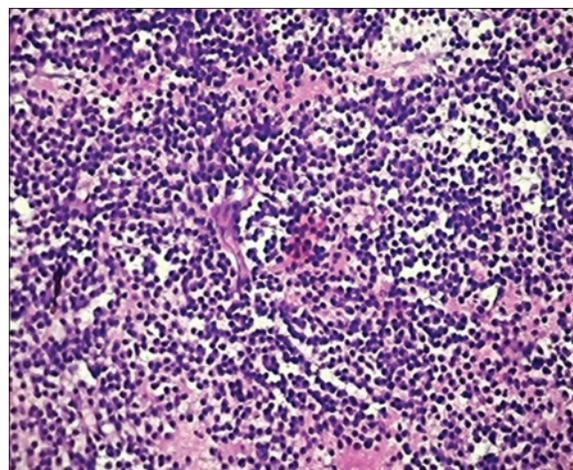


Figure 1: Plasmacytoma (H&E X400)

Table 1: Depicting the age, sex, histological subtypes and WHO grading of meningiomas

Age	Sex	Histologic subtypes	WHO grade
45	Female	Transitional	I
55	Male	Transitional	I
31	Female	Fibroblastic	I
50	Female	Meningotheliomatous	I
50	Female	Transitional	I
48	Male	Meningotheliomatous	I
50	Female	Transitional	I
35	Female	Transitional	I
49	Female	Transitional	I
35	Female	Meningotheliomatous	I
70	Male	Fibroblastic	I
21	Female	Transitional	I
45	Female	Meningotheliomatous	I
42	Female	Meningotheliomatous	I
55	Female	Fibroblastic	I
60	Female	Transitional	I
19	Female	Fibroblastic	I
71	Male	Meningotheliomatous	I
65	Female	Meningotheliomatous	I
24	Female	Atypical meningioma	II
28	Male	Atypical meningioma	II
32	Female	Atypical meningioma	II
58	Male	Meningotheliomatous	I
30	Male	Meningotheliomatous	I
62	Female	Meningotheliomatous	I
49	Female	Transitional	I
50	Male	Meningotheliomatous	I

astrocytomas Grade III (45.7%) was the commonest type followed by diffuse astrocytoma Grade II (34.3%) and glioblastoma multiforme Grade IV (20.0%).

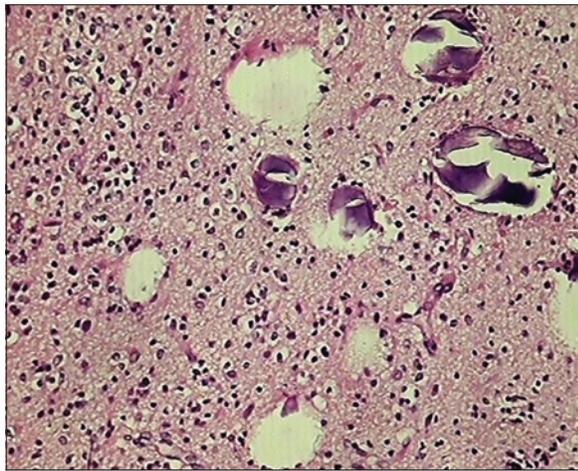


Figure 2: Oligodendroglioma (H&E X100)

Table 2: Percentage breakup of CNS tumors with histologic subtypes and WHO grading

Tumor types	WHO grading	Percentage
Tumor of neuroepithelial tissue		39.3
Astrocytic tumors		
Diffuse astrocytoma	Grade II	
Anaplastic astrocytoma	Grade III	
Glioblastoma multiforme	Grade IV	
Oligodendroglial tumors		4.5
Oligodendroglioma	Grade II	
Anaplastic oligodendroglioma	Grade III	
Mixed gliomas		2.3
Oligoastrocytoma	Grade II	
Anaplastic oligoastrocytoma	Grade III	
Ependymal tumors		2.3
Ependymoma	Grade II	
Choroid plexus tumors		2.3
Choroid plexus papilloma	Grade I	
Choroid plexus carcinoma	Grade IV	
Embryonal tumors		1.1
Medulloblastoma	Grade IV	
Tumors of peripheral nerves		4.5
Neurofibroma	Grade I	
Tumors of meninges		34.8
Meningiomas		
Meningiomas	Grade I	
Atypical meningiomas	Grade II	
Mesenchymal, non-meningothelial tumors		3.4
Lipoma	Grade I	
Haemangioma	Grade I	
Tumors of uncertain histogenesis		1.1
Hemangioblastoma	Grade I	
Lymphomas and haemopoietic neoplasm		1.1
Plasmacytoma	Grade IV	
Tumors of the sellar region		2.3
Craniopharyngioma	Grade I	
Metastatic tumors		5.6

CNS: Central nervous system, WHO: World Health Organization

Meningiomas (Figure 3) dominated the tumors of meninges contributing 30.3% of the total 34.8% followed by mesenchymal, not meningeal tumors (3.4%) and occasional tumors of uncertain histogenesis (1.1%).

The mean age in meningiomas was found to be 45.5 years, and family preponderance was seen in the ratio of 1:1.2.

Atypical meningiomas constituted 3.34% of the total meningiomas and occurred in the younger age group with a mean age of 28 years. A wide range of histologic subtypes was observed in meningiomas, and WHO grading system was applied to them (Table 3).

This was followed by metastatic tumors (Figure 4) that constituted 5.6% of the total tumors with a mean age of 61 years and slight male preponderance (3:2).

The pediatric tumors were peculiar by their histologic diversity with astrocytic tumors (25% of pediatric tumors) taking a lead. The median age in pediatric tumors was found to be 9.4 years with equal male to female ratio (1:1). (Table 4)

DISCUSSION

The incidence of CNS tumors is quite low in adults while they form the second most common childhood tumors after leukemia.⁴ Adult CNS tumors differ

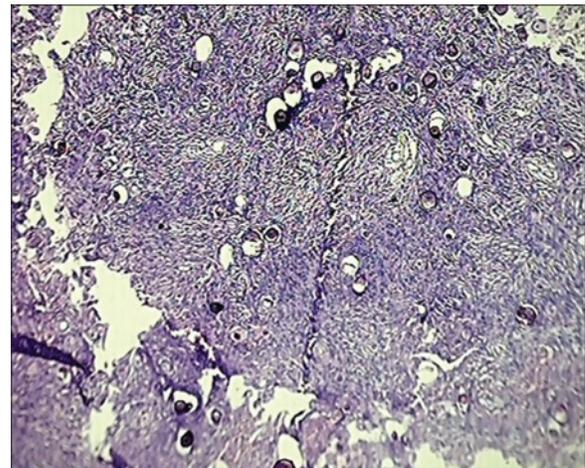


Figure 3: Meningioma (H&E X100)

Table 3: Percentage split of astrocytic tumors

Type of astrocytic tumor	WHO grade	Percentage
Diffuse astrocytoma	Grade II	34.3
Anaplastic astrocytoma	Grade III	45.7
Glioblastoma multiforme	Grade IV	20

WHO: World Health Organization

Table 4: Distribution of CNS tumors with histologic subtypes among children and teenagers (age 0-19 years)

Age	Sex	Histologic subtype	WHO grade	Percentage
18 years	Female	Cavernous hemangioma	Grade 1	8.3
10 months	Male	Choroid plexus carcinoma	Grade IV	8.3
8 years	Male	Medulloblastoma	Grade IV	8.3
17 years	Female	Craniopharyngioma	Grade I	8.3
5 years	Male	Choroid plexus papilloma	Grade I	8.3
10 years	Male	PNST-neurofibroma	Grade I	8.3
15 years	Male	Diffuse fibrillary astrocytoma	Grade II	8.3
6 months	Male	Inadequate biopsy		8.3
14 years	Female	Anaplastic oligodendroglioma	Grade III	8.3
19 years	Female	Meningioma-fibroblastic	Grade I	8.3
11 years	Female	Glioblastoma multiforme	Grade IV	8.3
5 years	Female	Anaplastic astrocytoma	Grade III	8.3

CNS: Central nervous system, PNST: Peripheral nerve sheath tumors, WHO: World Health Organization

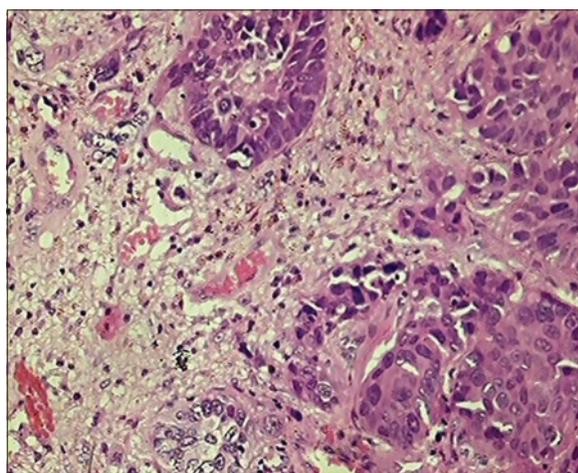


Figure 4: Metastatic carcinomatous deposits (H&E X100)

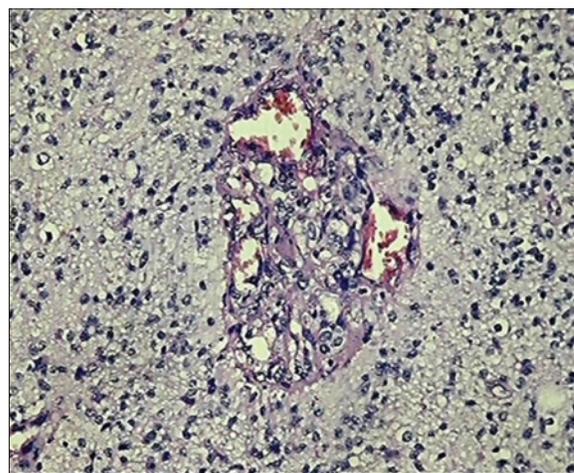


Figure 5: Anaplastic Astrocytoma exhibiting vascular proliferation. (H&E X400)

significantly from childhood brain tumors in relation to their sites of origin, clinical presentation, tendency to disseminate, histological features and their biological behavior. Whereas in adults the predominant CNS tumor types are metastases, glial neoplasms, and meningiomas, in children, besides gliomas, other major tumor types including primitive embryonal neoplasms are also common. In recent times, an enhanced understanding of these biological differences between adult and childhood CNS tumors has led to investigations in distinct molecular and genetic pathways and therapeutic approaches for each tumor type.

It has been observed worldwide that the incidence of CNS tumors is on a rise. Moreover due to the high mortality seen in CNS tumors, they form the most challenging group of tumors for neurooncologists.

In the present study comprising of 100 CNS tumors irrespective of age, from a single center, have been categorized according to the recent WHO classification.⁵ In our study, the most common CNS tumors in the

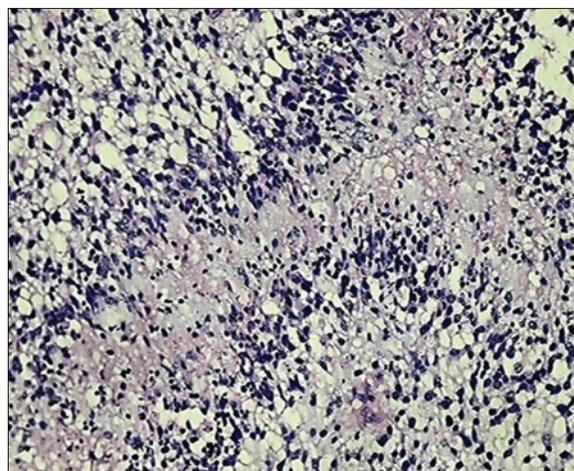


Figure 6: Glioblastoma Multiforme (H&E X400)

descending order are tumors of neuroepithelial tissue (51.7%) followed by tumors of meninges (34.8%) and metastatic tumors (5.6%). This was in concordance with the nationwide database in France which revealed the proportion of tumors of neuroepithelial tissue and the

meninges were 53.9% and 28.8%, respectively, from 2004 to 2008.⁶ Another population-based report from Central Brain Tumor Registry of the United States (CBTRUS) recorded rates of 33.7% and 35.5%, respectively, from 2004 to 2007.⁷ The reason for this variation remains unknown and requires further investigation.⁸ For the tumors of the meninges, increasing trends were observed around the world,⁹⁻¹⁵ and improvements in the diagnostic technologies are still considered to be the major causal factor. Worldwide studies have also demonstrated an apparently increased incidence of metastatic tumors,¹⁶ supporting their third position in our study.

The tumor spectra varied from adults to children and teenagers as well as from males to females. In our study, astrocytic tumors (45.7%) were the major tumor entity with anaplastic astrocytoma (Figure 5) topping the list followed by diffuse astrocytoma (34.3%). This was contrary to CBTRUS data, in which glioblastoma (Figure 6) and anaplastic astrocytoma were the most common malignant tumors in adults.

The CNS tumors in children and teenagers showed a great histologic diversity. The most common CNS tumor in our study was astrocytic tumors comprising 25% of all tumors in this age group. This was in concordance with the study did by Chen *et al.* who found astrocytomas to be leading tumors (29.2%) in this age group in their 60 years review of cases.⁸ While in a multi-institutional study did by Jain *et al.* find a slight higher proportion of astrocytoma (34.7%) as compared to our study.³

The incidence of various CNS tumors in the current study falls well within the range seen in the international studies for every tumor category.

CONCLUSION

Rising global trends in the incidence of CNS tumors, irrespective of age have been observed. The present study

highlights the histologic diversity in CNS tumors in both, adult as well as pediatric age groups.

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Comparative Evaluation of Results of Cross Pin Fixation by Conventional Method with Dorgan's Method in Displaced Supracondylar Fracture in Children

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Abstract

Introduction: Closed manipulation and percutaneous K-wire fixation are the standard treatment of displaced supracondylar fractures of the humerus in children. The most common complication is an injury of the ulnar nerve during insertion of medial K-wire. In this study, two fixation methods, the traditional cross wire (medial and lateral) and the Dorgan's percutaneous lateral cross-wiring technique will be evaluated.

Purpose: The aim of the study is to compare the results by two different modalities of management.

Methods: The study was done in our institution over a period of 1½ year. The inclusion criteria are displaced fracture (Gartland Type II and III) without any neurovascular deficits. We exclude open fractures, pathological fractures, more than seven days old fractures. Patients are followed up for a period of 12 months.

Results: Among the 97 patients, full follow-up is available for 85 patients. Among them, 45 patients are treated with conventional cross pin method and 40 patients are treated by Dorgan method. We have found there are no statistically difference results between two groups.

Conclusion: The conclusion is that close reduction and percutaneous fixation techniques are the standard methods by providing rigid stability and good union rate. Dorgan's lateral cross-wiring technique has the advantage of both-stability of cross wire fixation and avoiding the ulnar nerve injury. Although the results are not statistically significant.

Key words: Children, Conventional medial-lateral pinning, Dorgan's method, Supracondylar humerus fracture

INTRODUCTION

Supracondylar fracture of the humerus is among the most common fractures in children, and completely displaced fractures usually necessitate surgical treatment.¹ Supracondylar area is most vulnerable to fracture because or tubular shaft of humerus becomes triangular in this area leads to stress raiser, and thin cortical bone due to coronoid

fossa and olecranon fossa.² The standard mode of treatment for the displaced fracture in children is closed reduction and percutaneous pin fixation.³⁻⁵ Completely displaced fractures usually necessitate surgical treatment. Different pin fixation techniques have been described including medial lateral 2 cross pins and lateral 2 pins.⁶ It has been proved that cross pin fixation is superior than lateral pin fixation.⁷⁻⁹ Although ulnar nerve injury up to 6% from use of a medial pin is common, and this possibility is most likely to occur when the medial epicondyle cannot be palpated in swollen elbows.¹⁰ There are many techniques for Kirschner wire fixation. The incidence of cubitus varus deformity after treatment was about 5% according to Flynn while Arino reported that it was almost 21%. In a prospective study, Chai reported that 8 (15%) of 54 patients developed iatrogenic ulnar nerve deficit after treatment with medial-

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lateral pin fixation. In supracondylar humerus fracture among them conventional K-wire fixation is a most popular surgical method. Controversy exists about the optimal K-wire configuration in displaced Type II and III fracture. In present study an alternate method of fixation with very minimum complications. In our study, we compare the outcome of displaced supracondylar fractures fixed by a conventional cross K-wire technique in one group, and another group of patients operated by two cross K-wire from the lateral side was used.

MATERIALS AND METHODS

This is a prospective randomized controlled study conducted at Institute of Post-Graduate Medical Education & Research) from February 2011 to March 2014 after getting ethical permission. The catchment area of the Institute is Kolkata and its suburban area. All the patients with displaced supracondylar fracture (Garland Type - II and III) were included in this study. The guardians of the children were properly counseled about advantages, disadvantages, and possible complication of the procedure. After getting proper written consent from the guardian, children were included in the study. The inclusion criteria are displaced supracondylar fracture (Garland Type - II and III), close fracture without any distal neurovascular deficit and fracture occurring within 1 week. The patients with open fracture, pathological fracture, fracture associated with other co-morbid condition, previous fracture in either elbow and concomitant fracture or other injury in the same limb that will alter the treatment protocol of the supracondylar fractures were excluded.

Every patient was thoroughly examined at the time of admission. The first step was to assess the vascular status of the limb. Once, the case was deemed to be without vascular deficit (defined as absent or feeble <50% of the volume on the other side), and then evaluation was done using other exclusion and inclusion criteria. The median (with anterior interosseus) radial and ulnar nerves were tested and the finding documented. The skin condition and the amount of swelling were assessed. Fractures classifications were done by radiographs.

Check radiographs of the elbow were taken again if required in the anteroposterior and the true lateral planes if possible. The elbow was immobilized in a posterior long arm plaster of paris slab in the comfortable position of 50-60° of flexion. Analgesics were given, and the arm elevated to decrease swelling. The main investigator would perform the randomization by drawing lots – odd numbers signify medial-lateral pin fixation while even numbers would be treated by two lateral pin fixations by Dorgan method.

All patients were operated in supine position under general anesthesia within 48 h of admission. Tourniquet was not applied. The first reduction manoeuvre was performed with traction applied to the forearm with an assistant applying counter traction. First, the medial or lateral displacement of the fracture was corrected. After that rotational displacement was reduced with pronation and supination of the forearm. Final, fixation by smooth K-wire into the medial condyle from the lateral side. The medial condyle should not be penetrated to avoid ulnar nerve injury, but cortical involvement could be achieved (Figure 1). The principal is that the wires should cross above the fracture line. The similar way, conventional method of cross fixation was done (Figure 2).

Post-operative immediate neurological assessment for median, ulnar, and radial nerves, and anteroposterior and lateral X-rays were performed.

The patients with iatrogenic ulnar nerve lesions in both groups were followed up without any treatment. The mean hospitalization period was 1.7 days (range 1-5 days). We



Figure 1: X-ray photograph of Dorgan method of fixation



Figure 2: X-ray photograph of cross pin method of fixation

removed the cast K-wires after three weeks and started gentle active elbow exercises. At the last follow-up, we evaluate a range of motion and carrying angle by goniometer at both elbows. We evaluate the functional and cosmetic results according to the criteria proposed by Flynn *et al.* (Table 1).

RESULTS

In the present study, 97 treated patients for displaced supracondylar fracture were considered. Later 12 patients were drop out in follow-up. Among the 85 patients, we have treated 40 patients by Dorgan method and rest 45 patients have treated by conventional cross pin fixation method. The mean age of patients 7.51 years (range from 3 to 12 years) with standard deviation 0.08 years. The duration of injury to admission to the hospital was 0.33-72 h with mean 7.02 h. The interval from injury to surgery range from 10 to 80 h (mean, 32.98 h). Both groups under study had a similar pattern of duration from injury to surgery (Table 2). Among the 45 patients of crossed pin fixation group, 9 patients having Type-II fracture, 22 patients having Type III (post medial), and 14 patients Type III (post lateral) fracture. Among the 40 patients of Dorgan method group, 8 patients have Type II, 20 patients having Type III (post medial), and 12 patients have Type III (post lateral) fracture (Figure 3). 40 patients of Dorgan group, 23 patients have right elbow injury and 27 patients of cross pin fixation group having the right side supracondylar fracture humerus.

Sixty six out of 85 patients (33 on each group) had a carrying-angle loss of 0-4.9°, which was considered to be an excellent result (Figure 4). Of the eleven patients rated as having achieved a good result, nine had crossed pin fixation while two had Dorgan pin fixation. There were

only six patients in whom the result was rated as fair; two had crossed pin fixation, and four had Dorgan lateral pin fixation. Of the two patients rated as poor, 1 patient on each group. The mean loss of elbow extension was 7.21° (range, 2.15-16.4°) in cross pin fixation patients, while in Dorgan lateral pin fixation patients was 7.11° (range, 3.70-17.91°). Similarly, the mean loss in elbow flexion was 8.68° (range, 0.04-17.32°) and 11.28° (range, 0.86-21.66°) in conventional cross pin fixation and Dorgan lateral pin fixation patients respectively (Figure 5 and Table 3).

In 10 patients, the capitellum and medial epicondylar epiphyses had already fused at follow-up. So, 74 patients were available for measurement The Baumann angle loss and MEE angle. The mean Baumann angle loss in the cross pin fixation group and the Dorgan method of pin fixation group was 5.96° and 5.30°, respectively. The mean MEE angle loss in the cross pin fixation group and the Dorgan pin fixation group was 6.07° and 6.93°, respectively. Analyses of both the Baumann angle loss and the MEE angle loss using Student *t*-test showed no significant differences (Table 4).

Five (of all 97 patients) neurologic deficits were diagnosed on admission. One patient had ulnar nerve palsy while the other had median nerve injury. Of the 85 patients available

Table 1: Modified Flynn's criteria to evaluate outcome of treatment

Outcome	Loss of elbow ROM (°)	Loss of carrying angle (°)
Excellent	0-5	0-5
Good	6-10	6-10
Fair	11-15	11-15
Poor	>15	>15

Rom: Range of motion

Table 2: Duration injury to surgery for two methods of pin fixation

Injury to surgery interval (h)	Cross pin fixation	Dorgan method	Total
0-23.9	10	9	19
24-47.9	27	22	49
48-71.9	6	8	14
>72	2	1	3
Total	45	40	85

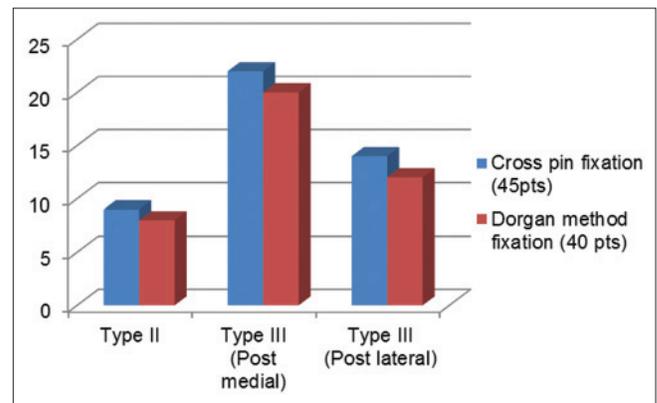


Figure 3: Distribution of type of fracture

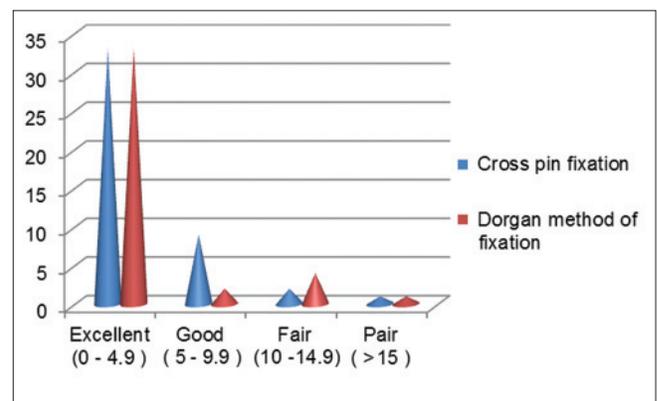


Figure 4: Analysis of results of carrying angle loss

for outcome evaluation, seven ulnar nerve injuries (five patients in the cross pin fixation group and two patients in the Dorgan lateral pin fixation group) were detected after the treatment procedure. Three radial nerve injury were found in Dorgan pin fixation group. These patients were followed up 6 weekly in the clinic, and all of them recovered completely within six.

We use crossed table method and Fisher's exact test to analyses the data of iatrogenic ulnar nerve injury between the two groups. The $P = 0.428$. Hence, there is no significant difference in the incidence of ulnar nerve injury.

Pin tract infection was found in five patients. Two of the patients were treated with cross pin fixation. All the patients were antibiotics orally. They all recovered at the subsequent follow-up. We have not encountered any vascular injury or deficit during and after surgery. We have found that patients with vascular deficit have good capillary refilling of the fingers and the radial pulse eventually reappeared after surgery. We have not found compartment syndrome or Volkmann ischemic contracture on the last clinical review.

In our study, according to Flynn criteria, among the 40 patients treated with Dorgan method 15 patients have excellent and 12 patients have a good result. In comparison to 21 patients have excellent and 14 patients have a good result by a conventional method (Figure 6). By applying student t -test, there was no statistical difference between the two groups (Table 5).

DISCUSSION

The mean follow-up duration of the 85 patients was 8.93 months (range, 3.13-14.73 months). Some patients

had developed elbow stiffness which was recovered by proper physiotherapy during follow-up. All the fractures were reduced under image intensifier. The Baumann angle and carrying angle was measured and compared with opposite side. There was no loss of reduction in both coronal and sagittal during healing time. The enrolment of both groups was randomized, and no statistical difference was found. So, there was no difference in stability providing by two methods of fixation between two groups.

Thirty seven patients had carrying-angle loss of 10° or more compared to the opposite elbow (16 of the patients in cross pin fixation, and 21 in Dorgan lateral pin fixation group). These patients would develop cubitus varus deformity which must be treated. Malunion in the sagittal plane rarely requires surgical correction. Sagittal plane deformity would not cause any functional disability and some improvement also happened due to remodeling of bone. So, it did not require any treatment.

Five patients in medial-lateral pin fixation group while two patients in Dorgan pin fixation group had ulnar nerve injury. We analyze the data by using the crossed table method and Fisher's exact test. The $P = 0.24$. Therefore, there was no statistical difference. We need a larger sample for bringing

Table 3: Analysis of results of carrying angle, elbow flexion and extension loss by student t -test

Parameters	Mean±SD		P value (student t -test)
	Cross pin fixation	Dorgan method of pin fixation	
Carrying angle loss (°)	3.58±4.5	3.7±4.24	0.913
Elbow lexion loss (°)	7.14±9.2	7.1±9.2	0.991
Elbow extension loss (°)	8.6±8.64	11.26±10.4	0.322

SD: Standard deviation

Table 4: Comparison of Baumann angle loss and MEE angle loss

Parameters	Mean±SD		P value (student t -test)
	Cross pin fixation	Dorgan method of pin fixation	
Baumann angle loss (°)	5.96±5.5	5.3±5.0	0.646
MEE angle loss (°)	6.07±5.2	6.93±6.6	0.597

SD: Standard deviation

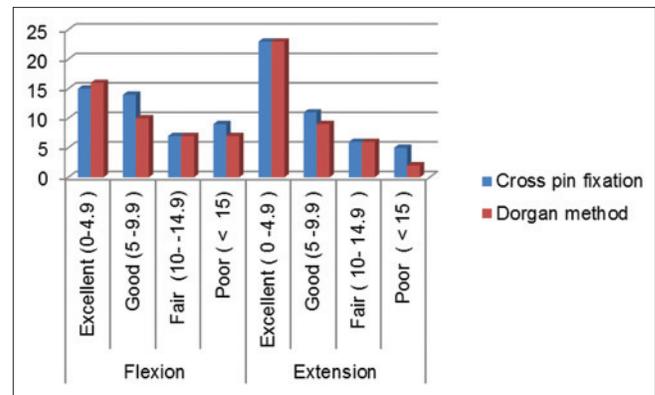


Figure 5: Analysis of results of flexion and extension loss

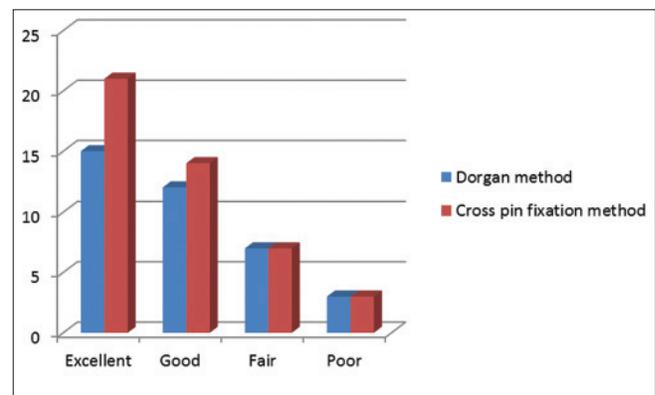


Figure 6: Analysis of result by Flynn criteria

Table 5: Comparison of result of two groups according to Flynn criteria

Parameter by Flynn criteria	Dorgan method (n=40)	Cross pin fixation (n=45)	P value
(Excellent+good)	27	35	<0.05
(Fair+poor)	13	10	<0.05

certainty in this issue. There was only one iatrogenic radial nerve injury in the Dorgan-lateral pin fixation. The value is too small to be analyzed. All nerve injuries in this study were most likely neuropraxia or axonotmesis. All patients were recovered without exploration or repair within 6 months after the operation. None of the patients in our series developed evidence of ischemic contracture to suggest muscle necrosis at follow-up.

CONCLUSION

From this prospective study, we come to conclusion that both methods provide rigid stability in both coronal and sagittal plane with negligible chance of nerve injury which has no statistical significance. However, further studies with a larger and more varied ethnic and occupations group may be warranted to bring certainty in this dilemma.

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Cyto-histological Correlative Study of Thyroid Neoplasms by Imprint Method

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Abstract

Background: Imprint cytology (IC) has become an indispensable component in the intra-operative rapid cytodagnosis of tumor types. Its rise as a worthy alternative to frozen sections in places where facilities for the same are not available is commendable as it is inexpensive procedure which yields smears, easy to interpret and is worthy of consideration to be included as a routine intra-operative diagnostic procedure in the evaluation of thyroid neoplasms.

Objectives: The objective of this study was to adopt intra-operative thyroid neoplasms in order to facilitate decision regarding extent of surgery to be performed, expedite the planning for therapy and to assess the efficacy of intra-operative IC by correlation with histopathological diagnosis.

Methods: A total of 96 patients with clinically diagnosed thyroid swellings from K. R. Hospital referred to the Department of Pathology and subsequently confirmed as thyroid neoplasms by fine-needle aspiration cytology and posted for surgery formed the basis for this study. Immediately following the surgical removal of the neoplasm, imprint smears were taken from the tumor area. The air dried or wet-fixed smears were stained routinely by rapid hematoxylin and eosin and by modified rapid papanicolaou method.

Results: Out of 96 cases of thyroid neoplasms, 58 cases were diagnosed as benign and 38 cases as malignant. Follicular neoplasms were 54 forming the majority among the benign tumors with 4 cases of Hurthle cell adenomas. Amongst the malignant tumors, 30 papillary carcinomas, 4 follicular carcinomas, and 2 cases each of non-Hodgkin lymphoma maltoma and anaplastic carcinoma were diagnosed.

Conclusion: The overall sensitivity was 95.45%, the specificity, and positive predictive value was 100% each and negative predictive value of 90.6% was seen in the present study. The overall accuracy encountered was 95.52%.

Key words: Adenomas, Benign, Neoplasm, Thyroid

INTRODUCTION

Disorders involving thyroid have been unique in both presentation and symptoms. Due to this, diagnosis of thyroid lesions and most importantly, thyroid neoplasms, forms an important aspect involving both the pathologist

and the operating surgeon. Thyroid nodules are common with an estimated prevalence ranging from 4% by palpation to 67% by ultrasonography.¹ Most of the thyroid neoplasms are clinically palpable and after a provisional clinical diagnosis, fine-needle aspiration plays a major role in determining nature of the tumor. It is during the operative procedure, that the role of pathologist comes into force, through the intra-operative diagnosis.

Imprint cytology (IC) is an intra-operative diagnostic technique introduced by Dudgeon and Patrick in the year 1927. After pioneering work, this technique remained in oblivion for years. Later, the immense potential of intra-operative imprint cytodagnosis was recognized and it came

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to be utilized in various diagnostic works.² Since freezing artifacts are avoided, the cytological details provided by the intra-operative cytological imprint specimens are superior to that of frozen sections (FS). Imprints cover a wide area of tissue, and therefore, differences of histological structures are more likely to be represented adequately and clearly than in conventional paraffin embedded sections taken from a small area. IC is simple, inexpensive, rapidly diagnostic, and easy to perform procedure especially in thyroid neoplasms. It has gained immense popularity globally and has been accepted as a routine diagnostic procedure in most of the hospitals worldwide. The present study was carried out to evaluate the diagnostic value of IC intraoperatively along with histopathological correlation.

METHODS

The study comprises of 96 cases of IC of thyroid neoplasms. The lesions were confirmed as thyroid neoplasms by fine-needle aspiration cytology (FNAC) and posted for surgery. The imprint procedure was done intraoperatively at K. R. Hospital attached to Mysore Medical College, Mysore. The results were subsequently correlated with the histopathological diagnosis.

IC was done intraoperatively under the guidance of the operating surgeon after obtaining informed consent from the patient. The procedure was done under absolute aseptic precautions by the pathologist.

The imprint smears were prepared from the cut surface of freshly dissected thyroid specimen by touching the glass slides on surface, focusing on suspicious areas. The smears were immediately wet-fixed in 95% alcohol fixative and stained by ultrafast Papanicolaou technique. Carnoy's fixative was used when smears were hemorrhagic and in few cases, smears were air dried and stained with May-Grünwald-Giemsa stain. The resected specimen was sent for histopathological examination for correlative study.

RESULTS

Of the 96 cases, maximum incidence of cases was in the 21-30 and 31-40 years with 28 cases in each category. Greater than 60 years category showed lowest incidence with 6 cases (Figure 1). The present study showed a female predominance with majority of cases being females (94 cases) (Figure 2). The most common clinical diagnosis was solitary nodule of thyroid accounting to 54.16% (52 cases). The follicular neoplasm constituted the most common diagnosis by FNAC owing to 72.9% (70 cases). 62.5% of cases were diagnosed as follicular neoplasm by IC followed by 22.9% of cases with a diagnosis of papillary

carcinoma (Table 1). On IC, 70 cases were diagnosed as benign (72.9%) and 26 were malignant (27.09%) (Figure 3). Histopathologically, 54 cases (56.25%) were found to be of follicular adenoma followed by 30 cases (31.25%) of papillary carcinoma. Two cases each of anaplastic

Table 1: Distribution of cases diagnosed by IC

Imprint diagnosis	Number of cases	Percentage
Follicular neoplasm	60	62.5
Papillary carcinoma	22	22.91
Colloid goiter	6	6.25
Hurthle cell neoplasm	4	4.16
NHL	2	2.08
Anaplastic carcinoma	2	2.08
Total	96	

IC: Imprint cytology, NHL: Non-Hodgkin lymphoma

Table 2: Distribution of cases based on histopathology

Histopathological diagnosis	Number of cases	Percentage
Follicular adenoma	54	56.25
Papillary carcinoma	30	31.25
Anaplastic carcinoma	2	2.08
NHL maltoma	2	2.08
Follicular carcinoma	4	4.16
Hurthle cell adenoma	4	4.12
Total	96	

NHL: Non-Hodgkin lymphoma

Table 3: Correlative results of IC and histopathology

Imprint diagnosis	Diagnosis by histopathology
Benign (70) (72.9%)	Benign (58) (60.41%)
Follicular neoplasm (60)	Follicular adenoma (54)
Colloid goiter (10)	
Hurthle cell neoplasm (4)	Hurthle cell adenoma (4)
Malignant (26) (27.08%)	Malignant (38) (39.58%)
Papillary carcinoma (24)	Papillary carcinoma (30)
Anaplastic carcinoma (2)	Anaplastic carcinoma (2)
NHL maltoma (2)	NHL maltoma (2)
	Follicular carcinoma (4)

IC: Imprint cytology, NHL: Non-Hodgkin lymphoma

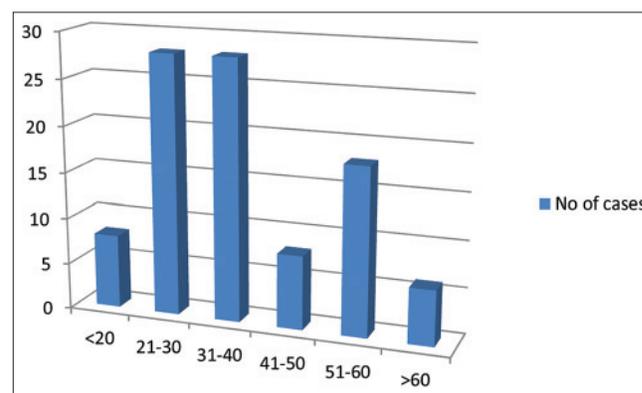


Figure 1: Age distribution in the present study

carcinoma and non-Hodgkin lymphoma (NHL) maltoma were reported (Tables 2 and 3).

DISCUSSION

IC has been an accepted method for the intra-operative cytodagnosis of thyroid neoplasms, because of its rapidity of diagnosis and high sensitivity in delineating benign and malignant tumors. The quick decisions that can be taken during management of cases postoperatively following imprint diagnosis, only add up to the many advantages that the method has to offer.

Jose *et al.* studied 98 cases in which the age incidence varied from 17 years to 65 years with a mean age of 35.5 years. The male to female ratio was 1:5.5.³ According to Taneri *et al.*, the mean age was 47 and the ranged being between 24 and 67 years.⁴ In the present study of 96 cases, the age varied between 16 and 85 years with a mean age of 38.17 years. The male to female ratio was found to be 1:47.

Francis and Das in their study involving FNAC, IC and FS found a sensitivity of 68.4%, 85%, and 65%, respectively. In all the three procedures, the specificity was 100%, and the false positive rate was 0%. A 93.3% diagnostic accuracy was achieved with combined IC and FS.⁵ In the present study, sensitivity was 95.74%, and a specificity of 100% was noted. The positive predictive value (PPV) stood at 100%

and negative predictive value (NPV) at a value of 90.6%. The overall accuracy of the study was 95.52%. Ferit *et al.* reported a sensitivity of 83.3%, specificity of 97.7%, PPV of 75%, NPV of 97.7%, and accuracy of 96%.⁴

In the present study, out of 96 cases diagnosed by imprint study, 70 cases were benign with a 72% incidence and 26 were malignant with a 28% incidence.

The follicular adenomas (Figures 4-6) accounted to 93% of benign cases (54/58) in the present study. The follicular adenomas are the most common among thyroid neoplasms. The cytology shows follicular cells in sheets and dispersed cells. The presence of micro follicular aggregates implies a follicular neoplasm. Since the presence of capsule cannot be assessed in aspirates, these are better termed as follicular neoplasms.^{3,6-8}

Four cases of Hurthle cell neoplasm (Figures 7 and 8) were reported which on cytology showed cellular aspirates

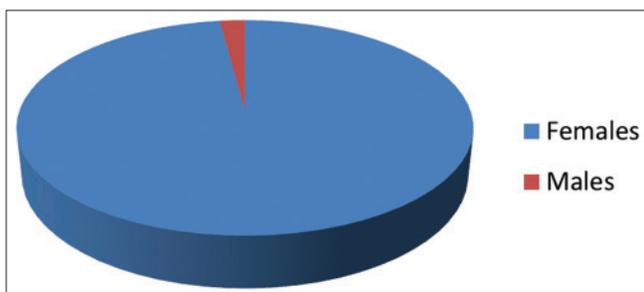


Figure 2: Sex incidences in the present study

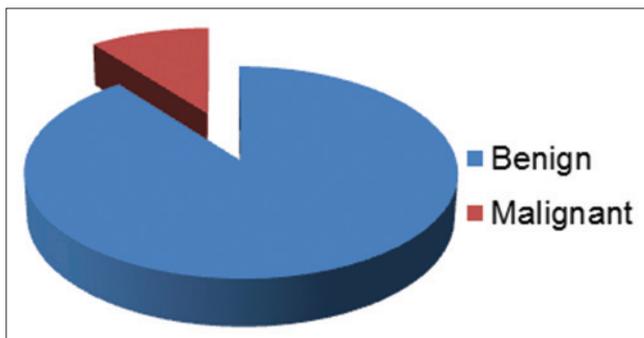


Figure 3: Distribution of benign and malignant cases diagnosed by imprint cytology

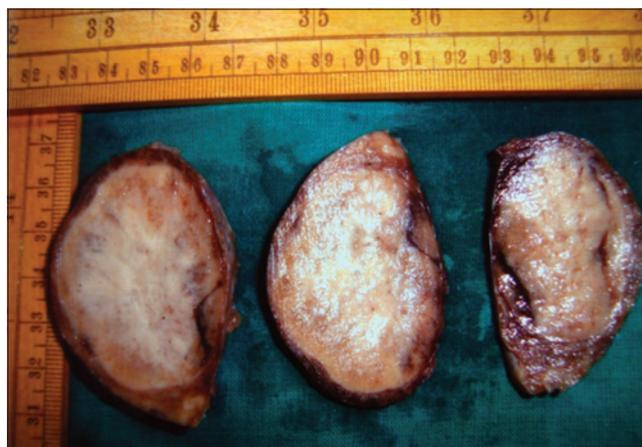


Figure 4: Follicular neoplasm showing gray white encapsulated mass with occasional areas of hemorrhage and degeneration

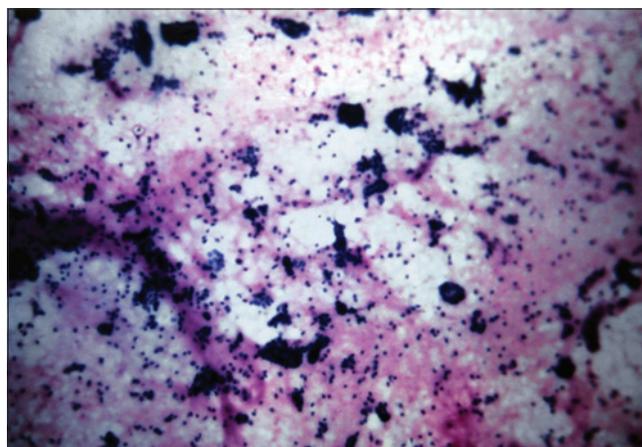


Figure 5: Imprint smear of Follicular neoplasm showing numerous microfollicles

of tumor cells in loosely cohesive groups and papillaroid architecture. These tumor cells were large, polygonal to

oval with characteristic abundant finely granular blue gray cytoplasm.^{3,9}

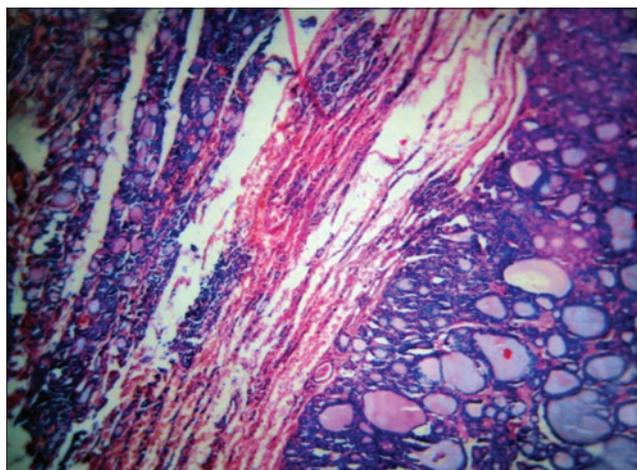


Figure 6: Histopathology of follicular adenoma depicting a well circumscribed lesion composed of micro and macrofollicles with surrounding compressed normal thyroid tissue

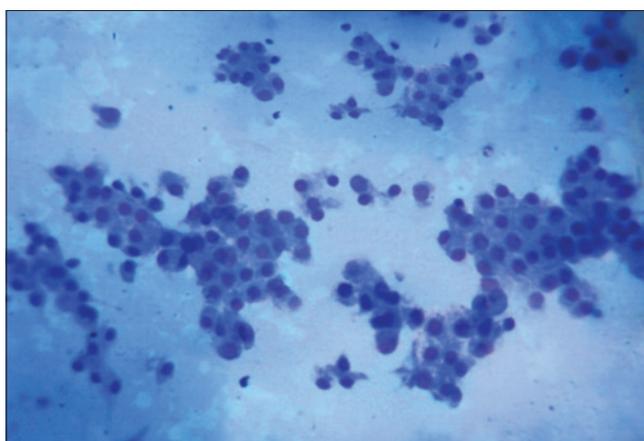


Figure 7: Imprint smear of Hurthle cell neoplasm showing oxyphil cells in follicular patterns and clusters

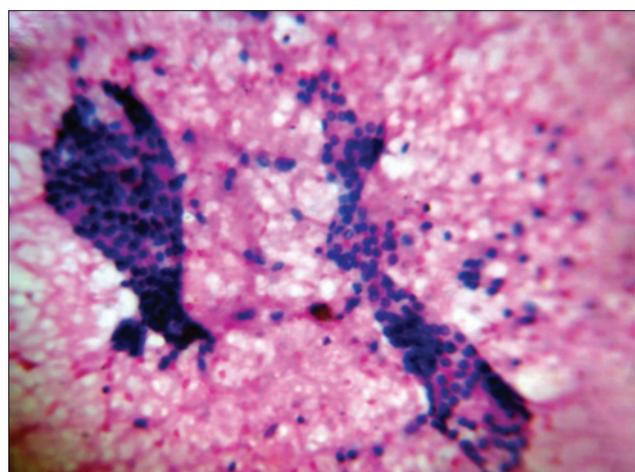


Figure 8: Imprint smear showing papillary structures with nuclear features

Among the malignant tumors, papillary carcinoma (Figures 8 and 9) was the most common encountered constituting 78.94% of malignant cases (30/38). It is the most common malignancy of thyroid with a female sex predominance of 3:1. The spread of the tumor is by lymphatics. Cytologically, aspirates are cellular and are comprised of papillary fronds with a fibrovascular core and lined by tumor cells. These cells are large with nuclei showing intranuclear cytoplasmic inclusions, nuclear grooves, and clefts.¹⁰⁻¹⁴

Two cases of anaplastic carcinoma (Figure 10) were reported which on cytology shows bizarre giant or spindle cells in singles and small clusters. The cells have pleomorphic nuclei and maybe multinucleate with coarse clumped chromatin.^{6,11,15,16}

Two rare cases of NHL maltoma (Figure 11) were encountered. It is an indolent tumor in the thyroid which remains localized for a long time before dissemination. The

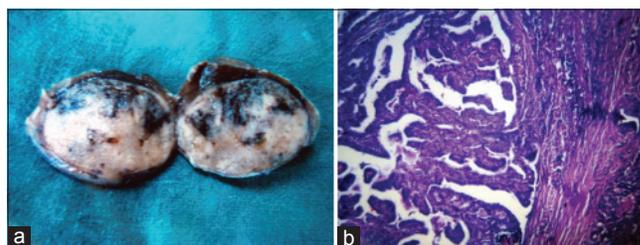


Figure 9: Gross (a) and microscopy (b) of well encapsulated variant of papillary carcinoma of thyroid

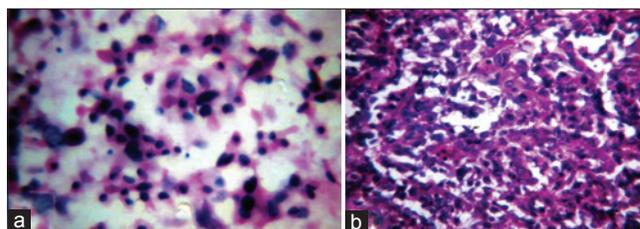


Figure 10: Imprint smear (a) and histopathology (b) of anaplastic carcinoma thyroid

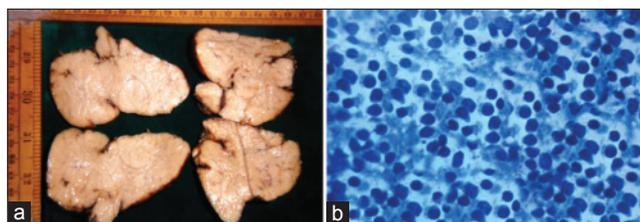


Figure 11: Gross (a) and imprint smear of non-Hodgkins lymphoma

lymphoma cells are centrocyte-like with irregular, folded, darkly stained nuclei, and scanty pale cytoplasm.^{6,16}

CONCLUSION

Intra-operative cytology of imprint smears is very valuable in determining the precise area of surgical extirpation of thyroid tumors and also serves as an object of defining therapeutic decision quickly. It is a safe, simple, feasible, and dependable method for rapid cytodagnosis of thyroid neoplasms.

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Otitis Media with Effusion Plain Myringotomy versus Myringotomy with Grommet Insertion

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Abstract

Introduction: Otitis media with effusion is one of the most common causes of conductive deafness. Thorough assessment leading to the diagnosis is imperative for good treatment options. Various modalities have been tried for the same with mixed outcome.

Aim: The aim of present study is to compare the two of the commonest surgical procedures performed for the treatment of the condition.

Materials and Methods: Retrospective study based on the analysis of the records of 72 patients presenting to the outpatient department of KBN Institute of Medical Sciences, Gulbarga, Karnataka, India, between January 2015 and August 2015. All the patients had been subjected to the tuning fork tests, pure tone audiometry and tympanometry and conclusively diagnosed with otitis media with effusion.

Result: The results were assessed on the basis of subjective improvement in symptoms and closure of A-B gap on pure tone audiograms.

Conclusion: Otitis media with effusion has long been known to be one of the leading causes of conductive deafness in the population especially the pediatric group.

Key words: Audiometry, Deafness, Effusion, Myringotomy, Tympanotomy

INTRODUCTION

Acute suppurative otitis media is defined as the acute inflammation of the mucoperiosteum of the middle ear cleft. The pathology arising in the Eustachian tube and spreading on to the middle ear cavity.^{1,2} The causative organisms are believed to be *Staphylococcus aureus*, Streptococci, *Haemophilus Influenza*, Moraxella. The course of the disease begins with the stage of Eustachian Catarrh where pain and deafness are the predominating symptoms and examination of the tympanic membrane reveals retraction and congestion.³⁻⁵

The second stage is the presuppurative stage characterized by collection of fluid in the middle ear cavity which initially

is sterile, but becomes a good source for the growth of bacteria, eventually leading to the stage of suppuration that is characterized by the presence of pus which eventually gets extruded in the external auditory canal presenting as discharge as a result of the rupture of the tympanic membrane. Eventually, the disease goes into remission following antibiotic treatment or by nature of the hosts immunity. In certain instances, this does not happen leading to the persistence of collection in the middle ear which is sterile as a result of long-standing usage of antibiotics. The primary source of all these events is the Eustachian tube infection. Children who frequently complain of repeated ear pain and discharge not responding to regular line of treatment often are investigated for adenoidal hypertrophy, by radiological examinations or diagnostic nasal endoscopy, which if enlarged needs surgery to relieve the chronic Eustachian tube obstruction.⁶⁻⁹

The sequel of long standing Eustachian tube pathology varies from suppurative otitis media to otitis media with effusion and atelectasis. In individuals who are prone for such repeated Eustachian tube insults need treatment of

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the cause as in adenoidectomy. Most children respond after this with eventual resolution of symptoms but in a few if the middle ear collection fails to resolve which symptomatically presents as persistence of deafness and aural fullness, myringotomy with or without grommet (Figure 1) or exploration of middle ear in the form of tympanotomy may be needed. Long standing use of antibiotics for treatment of repeated ear infections often predisposes the individual to the development of otitis media with effusion, which if untreated leads to more irreversible sequelae such as atelectasis and retraction pockets which would then necessitate a surgical exploration of the middle ear and reconstruction.¹⁰⁻¹³



Figure 1: Grommet on the tympanic membrane

MATERIALS AND METHODS

The protocol was approved by Local Ethics Committee, and Written Informed Consent was taken from each patient. A retrospective study based on the analysis of the records of 72 patients presenting to the outpatient department of KBN Institute of Medical sciences, Gulbarga, Karnataka, India, between January 2015 and August 2015. All cases of Retractions suggestive of an unsafe pathology were excluded from the study. All the patients had been subjected to the tuning fork tests, pure tone audiometry and tympanometry. Moreover conclusively, diagnosed with otitis media with effusion.

RESULTS

About 38 patients (52.77%) underwent myringotomy with grommet insertion and 34 patients (47.22%) underwent only myringotomy. Of the 38 patients who underwent myringotomy with grommet insertion (Figure 1), 32 (84.21%) patients had improvement in the symptoms and 27 (71%) had closure of the air-bone gap on pure tone audiogram.

The remaining 34 patients underwent only myringotomy of which 24 (70.58%) had improvement in hearing and 20 (58.82%) had changes in audiogram (Table 1).

DISCUSSIONS

Otitis media with effusion is a significant cause for conductive deafness in the general population. Adenoids are known to be the primary cause for the same in the pediatric age group. Even adult patients who are subjected to prolonged antibiotic treatment for middle ear infections are also predisposed to develop otitis media with effusion. The characteristic feature of the condition being an accumulation of sterile thick fluid in the middle ear that

Table 1: Results of the study

Number of patients (72)	Myringotomy only (34)	Myringotomy with Grommet (38)
Subjective improvement (%)	24 (70.58)	32 (84.21)
Closure of A-B gap (%)	20 (58.82)	27 (70.58)

fails to respond to the regular line of treatment leading to hearing impairment and occasionally pain and tinnitus. The examination finding of an intact tympanic membrane that appears dull and bulging with reduced mobility seems to aid in the diagnosis. At times, the finding of air-fluid level on the membrane, as well as bubbles visualized also help the diagnosis. Tympanometry reveals a classical type B curve with negative middle ear pressures also helps in the diagnosis. Surgical intervention in the form of ventilation tubes or myringotomy or exploratory tympanotomy has been tried with varying results.^{14,15} Although pediatric age is the most common involved, at times even adults seem to be affected by the condition. Most children often are advised adenoidectomy with Grommet insertion for the condition. At times when the diagnosis is in doubt even plain myringotomy has been suggested for the treatment of the condition. Over a period of time the grommet will aerate the middle ear sufficiently till the Eustachian tube recovers its function.

CONCLUSIONS

Otitis media with effusion has long been known to be one of the leading causes of conductive deafness in the population especially the pediatric group. Hence, the study has been designed to study the efficacy of Grommets against plain myringotomy in middle ear effusion. The study proves that myringotomy with Grommet insertion yields significant improvement in results both subjectively and on Audiometry, compared to myringotomy alone. Only

in few select patients where the secretions are very thick does the need for exploration deserves a mention, or in cases which fail to respond to myringotomy.

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Correlation of Non-alcoholic Fatty Liver Disease and Diabetes Mellitus

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Abstract

Introduction: The non-alcoholic fatty liver disease is a metabolic disorder that has typical characteristics of insulin resistance. The portal vein transports the glucose absorbed from the intestinal tract to the liver. Though the metabolism of glucose is controversial, some authors suggest that absorbed glucose is retained in the liver, so the rise in peripheral glucose concentrations shows the effect on postprandial glucose levels. Thus, this proves liver's major role in the regulation of systemic blood glucose levels. Hence, non-alcoholic fatty liver disease tends to cause diabetes due to impairments in liver function. The grading of fatty liver is done with radiological imaging and their respective postprandial sugar levels are analyzed.

Aim: The aim of the study is to assess the correlation of non-alcoholic fatty liver and diabetes mellitus.

Materials and Methods: Ultrasound reports of 100 patient non-alcoholics were collected prospectively from January to May 2015. The co-relation of sugar levels and grading in ultrasound is done, and respective percentages were obtained.

Results: Out of 100 cases, 30 and above aged patients were diagnosed to have fatty liver, and they were more prone to diabetes mellitus with glucose levels higher as the grading increases.

Conclusion: In general, patients presenting with fatty liver in ultrasound examination should check for diabetes as they have more chances and as the grade of fatty liver in ultrasound increases the probability of occurrence of diabetes mellitus also increases.

Key words: Diabetes mellitus, Fatty liver, Ultrasound

INTRODUCTION

Non-alcoholic fatty liver disease always has natural co-existence of diabetes mellitus. It is a clinicopathologic condition of steatohepatitis in patients who do not consume alcohol. It is a wide range of metabolic syndrome.¹ It is a progressive disease from non-alcoholic steatosis to hepatic cancer rarely. Ballooning of hepatocytes due to the accumulation of fat and lobular inflammation, which is a typical characterization of non-alcoholic fatty liver disease.

It is the most common disease found in large population worldwide. Many studies have proven that non-alcoholic fatty liver is found to be present in diabetes mellitus patient.²

The non-alcoholic fatty liver disease can be diagnosed using various imaging modality such as computed tomography, ultrasound, and histology. Where in ultrasound proves to be accurate and safe out of other noninvasive modality.^{3,4} Though computed tomography and magnetic resonance imaging serves to be more accurate but has its own disadvantage of using ionizing and time-consuming procedure. The grading of fatty liver is done based on the appearance of the liver and its vascular structures. Diabetes mellitus is quite prevalent among all age groups wherein the predisposing factors such as obesity and impairment of lipid metabolism in the liver. In a study conducted on obese

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women with diabetes, it was proven that all the women had non-alcoholic fatty liver disease with elevated liver enzymes.^{4,7}

Grading of fatty liver is done from Grade 0 to Grade III, where Grade 0 is normal appearance of liver with normal echotexture and size of liver (Figure 1), and as grade increases the echogenicity as the grade increases.

The increase in echogenicity solemnly depends on the accumulation of fat in hepatocytes, which makes the liver appear darker and reduces the contrast of the image. This makes the anechoic vascular structures invisible or unable to differentiate in terms of contrast.

Diabetes mellitus proven to be more earlier predictor of non-alcoholic fatty liver disease, which is been proven in many studies. Though ultrasound tends to have its own limitations in accuracy, it is proven to be better than other invasive techniques.

MATERIALS AND METHODS

In 100 non-alcoholic patients who have fulfilled the inclusion criteria are selected, and their liver are imaged using ultrasound and their postprandial sugar levels are diagnosed and a statistical co-relation of the collected data is done. The grading of fatty liver is done based on the appearance of liver's echogenicity and size is examined.

In Grade I, there is mild increase in echoes when compared to normal echogenicity with diaphragm appearing normal (Figure 2).

In Grade II, there is diffused increase in echoes and impaired appearance of anechoic vascular structures (Figure 3).

In Grade III, there is marked increase in echoes and no visualization of diaphragm and vasculature, due to loss of penetration of ultrasound waves. There is an increase in liver size also (Figure 4).

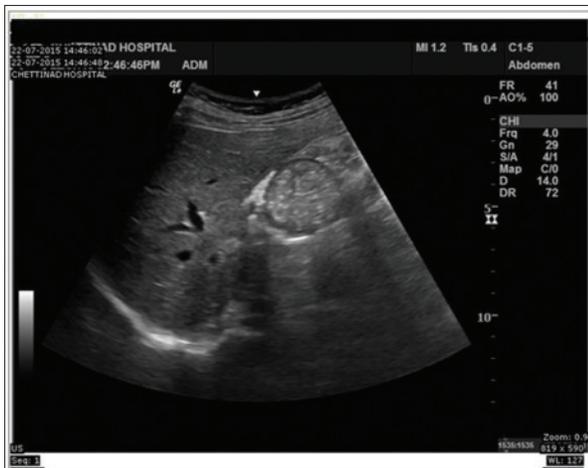


Figure 1: Grade 0 Fatty liver



Figure 3: Grade 2 Fatty liver

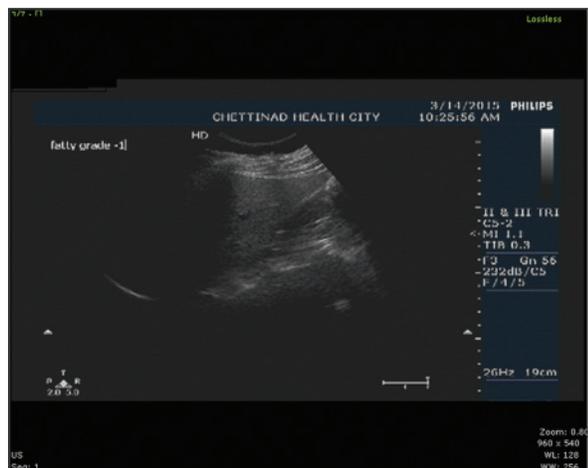


Figure 2: Grade 1 Fatty liver

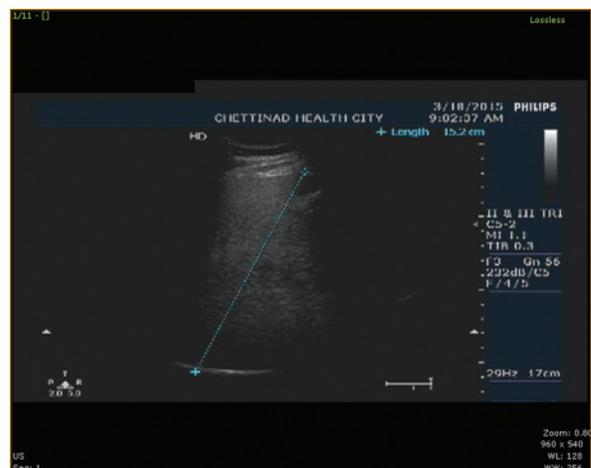


Figure 4: Grade 3 Fatty liver

These patients blood samples are collected and their postprandial sugar levels are investigated the values are collected, and statistical evaluation is done.

RESULTS

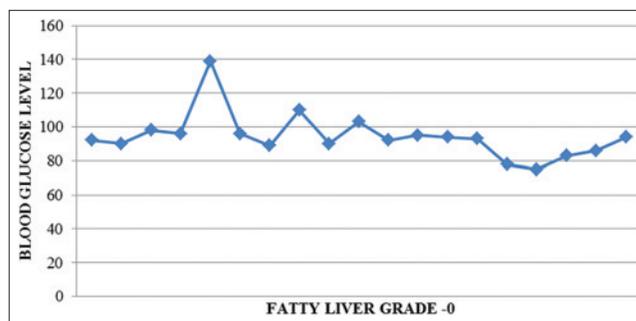
The study revealed that there is a significant correlation in fatty liver and occurrence of diabetes mellitus in patients without influence of alcohol consumption. In my study, it was 20 patients were graded to be Grade 0, i.e., normal appearance of liver, and out of it 17 patients had normal postprandial sugar levels (90-140 mg/dl) (Graph 1) and 3 patients had mild increase in sugar level (145-158 mg/dl) (Graph 2). About 38 patients were diagnosed to be Grade I in ultrasound examination (Graph 3), 24 patients were diagnosed to Grade II and 18 patients were diagnosed to be Grade III (Graph 4). Patients with Grade II and III fatty liver disease had obvious increase in postprandial blood sugar level. Grade I disease show borderline increase in sugar levels.

DISCUSSIONS

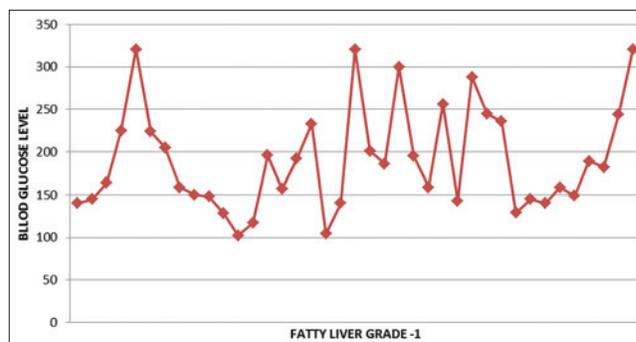
In our study, we were able to conclude that there was an association of non-alcoholic fatty liver and occurrence of diabetes mellitus. It was statistically proven that there was strong co-relation as grading of fatty liver increases there is a marked increase in postprandial sugar values. Thus which reveals that prevalence of diabetes mellitus is more when the severity of fat accumulation increases in the liver.⁸ Hence, we were able to use the grading of fatty liver using ultrasound as a predictor for occurrence of diabetes mellitus. Though the sensitivity of ultrasound grading should be taken into account where the specificity is quite less comparatively other advanced modalities such as computed tomography, magnetic resonance imaging, and biopsy. However, few years before biopsy was considered to be ideal modality of diagnosing fatty liver due to the evolution of ultrasound and other non-invasive modalities nowadays it became obsolete.⁹⁻¹¹

Administration of lipid-lowering drugs has been evaluated in patients with NAFLD/NASH, but not in large prospective controlled trials, and it has been associated with biochemical and histological improvement, but not all studies. The use of statins appears to be safe in patients monitored closely, to treat hyperlipidemia.¹²

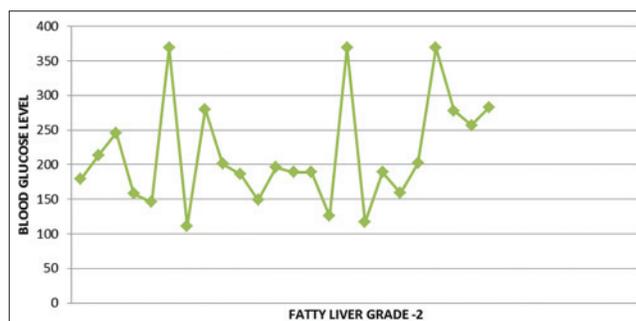
The study shows that non-alcoholic fatty liver disease grading tends to be a precursor for the early detection of diabetes mellitus and which can be used an early diagnostic tool in detection of diabetes mellitus. This tends to prove that the prevalence of diabetes mellitus in non-alcoholic



Graph 1: Fatty liver grade-0



Graph 2: Fatty liver grade-1



Graph 3: Fatty liver grade-2



Graph 4: Fatty liver grade-3

fatty liver disease patients is higher on higher grades such as Grade II and Grade III. In Grade 0, i.e., control group the blood glucose level is almost normal. And those patients who are likely to be diabetic are advised some lifestyle changes and weight control management to control their

blood glucose levels,¹³ with follow-up checkup. There have been many studies proven earlier that non-alcoholic fatty liver disease patients are more prevalent to diabetes mellitus. In this study, the results seem to be similar. The age group of non-alcoholic fatty liver disease is commonly middle-aged group, especially 30 years old and above is more prone. The grade of fatty liver and as well as blood glucose levels seems to be high.¹⁴

CONCLUSIONS

In our study, we were able to conclude that there is strong association of non-alcoholic fatty liver and occurrence of diabetes mellitus. It is statistically proven that there is strong co-relation as grading of fatty liver increases there is a marked increase in postprandial sugar values.

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Screening of Synthetic Benzofuran “3,4-Dihydro 4-Oxo-Benzofuro (3,2-d) Pyrimidine-2-Propionic Acid” for Anti-inflammatory Activity in Acute Models of Inflammation

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Abstract

Background: Benzofurans are heterocyclic compounds consisting of fused benzene and furan rings. They possess significant antibacterial, antifungal and antidepressant property, some studies have shown that they have anti-inflammatory property also. So, this study was conducted to ascertain if the compound “3,4-dihydro 4-oxo-benzofuro (3, 2-d) Pyrimidine-2-propionic acid” has anti-inflammatory activity in acute inflammation.

Materials and Methods: Albino rats were treated with benzofuran compound under study and phenyl butazone both 100 mg/kg, orally with 2% gum acacia as suspending agent and the effects were observed in acute models of inflammation namely, carrageenin-induced rat paw edema, and turpentine-induced peritonitis.

Results: Our study showed that benzofuran compound under study exhibited significant anti-inflammatory activity in both the models.

Conclusion: With our study, we conclude that benzofurans have significant anti-inflammatory activity and further detailed work with this compound, in different dosage profiles might be worth undertaking.

Key words: Benzofurans, Carrageenin, Inflammation, Phenyl butazone, Turpentine

INTRODUCTION

Inflammation is a defensive response mechanism of the body against the injurious stimuli, which helps to remove the harmful stimuli and initiate the process of healing of tissue. Inflammatory process involves a series of events that can be elicited by numerous stimuli such as infectious agents, ischemia, antigen-antibody interaction, and thermal, or other physical injury. At a macroscopic level, the response to injurious stimuli usually is accompanied by clinical signs of erythema, edema, tenderness, and pain.

Inflammatory responses occur in three distinct phases, namely (1) an acute transient phase, characterized by local vasodilation and increased capillary permeability; (2) a delayed, sub-acute phase, most prominently represented by infiltration of leukocytes and phagocytic cells, and (3) a chronic proliferative phase, in which tissue degeneration and fibrosis occur. All the above mentioned processes of inflammation are mediated by the inflammatory mediators such as prostaglandins leukotrienes, histamine, and serotonin.

When a tissue is injured, from any cause prostaglandin synthesis in that tissue increases. Prostaglandins have two major actions: They are mediators of inflammation and they also sensitize pain receptors at the nerve endings, lowering their threshold of response to stimuli and allowing other mediators of inflammation, e.g., histamine, serotonin, and bradykinin to intensify the activation of the sensory nerve endings. Naturally, a drug that inhibits the

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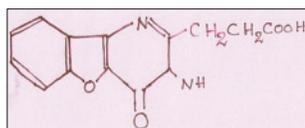
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synthesis of prostaglandins and leukotrienes can be of use in treating inflammation. Moreover, one way of inhibiting their synthesis is by inhibiting the enzymes cyclooxygenase and lipoxygenase.

Chemically, benzofurans are heterocyclic compounds containing fused benzene and furan rings. Benzofuran moiety constitute core of several interesting pharmacologically active products. They possess antibacterial,¹ antifungal,² anti-inflammatory,^{3,4} and antidepressant,⁵ activity. Benzofurans have been known to inhibit the enzymes cyclooxygenase and lipoxygenase,^{3,4} which are for the reasons mentioned above could be of use in treating inflammation. So, we undertook this study to screen the anti-inflammatory activity of the synthetic benzofuran compound, 3,4-dihydro 4-oxo-benzofuro (3,2-d) pyrimidine-2-propionic acid.

MATERIALS AND METHODS

Benzofuran compound 3,4-Dihydro-4-oxo-benzofuro (3,2-d) pyrimidine-2-propionic acid was the test drug under study, it is a white solid, insoluble water with following formula,



The benzofuran compound which was originally synthesized in the chemistry laboratory of Gulbarga University by Dr. Y. Agasimundin, reader in Chemistry, Gulbarga University, Gulbarga was used for the study.

Phenyl butazone⁶ that is a 3,5-dioxo-1,2-diphenyl-4-n-butyl pyrazolidine, a pyrazolone derivative, a well-known anti-inflammatory drug was used as standard drug was obtained from Pacific Pharmaceuticals Pvt. Ltd., Bangalore. All the aforementioned drugs were administered by mouth as a suspension with 2% gum acacia, in the dose of 100 mg/kg body weight with help of polythene tube. The control animals received an equal volume of plain 2% gum acacia suspension.

Animals used in the present study were Wistar albino rats of either sex of average weight 120 to 200 g, which were bred in the central animal house, were used for experiment. The study was done after getting the clearance of Institutional Animal Ethical Committee.

All the animals were allowed food and water ad libitum both being withdrawn just before the experiment. The animals were housed in a polypropylene cage under standard conditions in dim light and noise free room.

The above animals were divided into two main groups, one for the carrageenin-induced inflammation and the other for turpentine-induced peritonitis.

Carrageenin-induced rat paw edema model; In this model the first group of rats were sub divided into three groups of six rats each, one group of rats acted as control which was treated with 2% gum acacia orally, another group received standard drug phenyl butazone in the dose of 100 mg/kg body weight orally, the remaining group was treated with the test compound the benzofuran in the dose of 100 mg/kg body weight orally.

All the drugs were given 1 h prior to the subplantar injection of inflammation inducing agent carrageenin in 0.05 ml in the right hind paw.

The right hind paw volume was measured by using mercury plethysmograph, immediately after the subplantar injection of carrageenin, (0 h volume), and also at the end of 4 h. The difference between the 0 h paw edema volume and volume after 4 h indicated the actual edema.

So, the mean paw edema volume in animals treated with drugs groupwise was compared with that in the control group, and the anti-inflammatory activity of drugs was measured by the formula.

Percent of inhibition of edema, i.e., anti-inflammatory activity = $100 [1 - \frac{V_t}{V_c}]$ where V_t is the mean volume of paw edema in drug-treated group, and V_c is the mean volume of paw edema in the control group.

Turpentine-induced peritonitis model; in this model also rats were divided into three groups of six each. Here, again 2% gum acacia acted as control and 100 mg/kg of phenylbutazone as standard drug and benzofuran in the dose of 100 mg/kg as test drug. Peritonitis was induced by intraperitoneal injection of 0.5 ml of turpentine. All the drugs were given orally with gum acacia as a suspending agent, 1 h prior to intraperitoneal injection of 0.5 ml of turpentine. After the end of 4 h, the animals were sacrificed and the exudates were collected and measured immediately by cutting open the abdomen. The same formula was used as in the carrageenin method in order to calculate the percent of anti-inflammatory activity.

Statistical Analysis

All the data obtained were tabled as mean and standard error of mean, the data were analysed using Student's *t*-test.

RESULTS

There was significant reduction in the amount of rat paw volume in carrageenin model, i.e., the percent of inhibition

of edema formation was significantly higher as compared to control group. Moreover, the amount of reduction in exudates formation in turpentine-induced peritonitis model was also significant in both the models the percent of anti-inflammatory activity of test drug was statistically significant with $P < 0.05$ in both the models.

The Table 1 illustrates that the test compound benzofuran has got significant anti-inflammatory activity as compared to control in the carrageenin-induced rat paw model.

All the drugs are administered orally in the dose of 100 mg/kg body weight.

In Table 2 also it is seen that the test drug benzofuran has got significant anti-inflammatory activity as compared to control.

All the drugs are administered orally in the dose of 100 mg/kg body weight.

The Figure 1 clearly shows that the percent of inhibition of edema formation is significantly higher with test drug under study.

The Figure 2 illustrates that the amount of exudates formation is significantly lower in the benzofuran group, i.e., the percent of inhibition of exudates formation is significantly higher than the control group.

DISCUSSION

Inflammation can be defined as “the local reaction of vascularized tissue to injury.”⁷ Acute inflammation is a stereotypical response to all forms of injury, whatever the causative agent, it is of relatively short duration, lasting

for few minutes to several hours or 1-2 days, and its main characteristics are exudation of fluid and plasma protein and emigration of leukocytes. All these effects of acute inflammation are mainly mediated by prostaglandins, leukotrienes and histamine.⁸

Arthritis, arthralgia of major and minor joints is the burning problem of the age old populations affecting both the population equally well. The remedies for the same of the curative efforts are still a mirage however the present study throws a light on the usage of Benzofuran compounds, because of their anti-fungal, anti microbials properties and exploratory, anti-inflammatory activity of the said compound requires further evaluation as to consider for human trials for their aforesaid properties, however

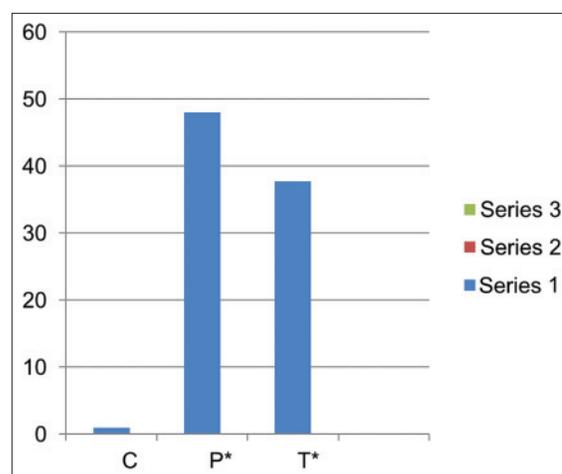


Figure 1: The percent of inhibition in carrageenin-induced paw edema model. Y axis indicates the percent of inhibition, C: Control, P: Phenyl butazone (standard), T: Test drug, i.e., benzofuran, *indicates $P < 0.01$

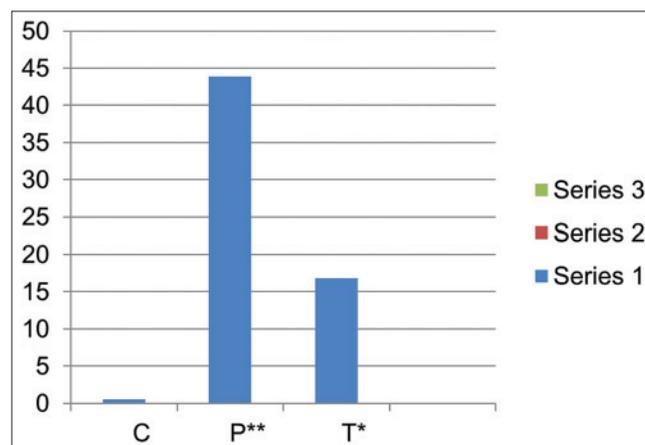


Figure 2: The percent of inhibition in turpentine-induced peritonitis model. Y axis indicates the percent of inhibition, C: Control, P: Phenylbutazone (standard), T: Test drug, i.e., benzofuran. **indicates highly significant P value, i.e., $P < 0.01$. *indicates the significant, i.e., $P < 0.05$

Table 1: Carrageenin-induced rat paw model

Groups	Mean paw edema volume (cm)±SEM	Percent inhibition
Control	0.58±0.036	-
Phenylbutazone (standard)	0.27±0.024	53.44*
Benzofuran (test drug)	0.36±0.03	37.93*

*Indicates highly significant: $P < 0.001$, SEM: Standard error for mean

Table 2: Turpentine-induced peritonitis model

Groups	Mean peritoneal exudates volume (ml)±SEM	Percent inhibition
Control	3.33±0.15	-
Phenylbutazone (standard)	1.87±0.12	43.84**
Benzofuran (test drug)	2.77±0.11	16.82*

**Indicates highly significant: $P < 0.001$, *indicates significant: $P < 0.05$, SEM: Standard error for mean

the toxic effects and therapeutic benefits with minimal adverse effects are those criteria's, which still needs to be fathomed out.

In our study, we observed that the test drug benzofuran showed significant anti-inflammatory activity in both the models. These observations can be explained on the basis that benzofurans are potent inhibitors of cyclooxygenase and lipoxygenase⁷ enzymes which are responsible for the synthesis of mediators of inflammation like prostaglandins and leukotrienes. From structure activity relationship, presence of certain functions like – COOH in benzofuran derivatives also contributes to the increase in potency of the test drug.⁷ Recently, metalloproteinases have been implicated as mediators of inflammation,⁹ and fusion of pyrimidine group to benzofurans also potentiates their anti-inflammatory activity by inhibition of metalloproteinases.¹⁰

CONCLUSION

With all the above-mentioned considerations we conclude that the test drug benzofuran has got significant anti-

inflammatory activity and further detailed work with this benzofuran compound, in different dosage profiles might be worth undertaking.

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Evaluation of Mediastinal Mass Lesions Using Multi-detector Row Computed Tomography and Correlation with Histopathological Diagnosis

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Abstract

Background: Multi-detector row computed tomography (MDCT) is a promising three-dimensional imaging tool allowing substantial anatomical volumes to be routinely covered with isotropic sub-millimeter spatial resolution. MDCT scans precisely localize lesions and biopsy needles diagnostic fine-needle aspiration for both benign and malignant disease processes has become a quite safe and highly accurate procedure.

Aims and Objectives: To correlate MDCT findings of the mediastinal mass lesions with histopathology. To differentiate between benign and malignant mediastinal mass lesions based on MDCT findings. To evaluate MDCT characteristics of mediastinal mass lesions.

Materials and Methods: This study was performed on 50 cases in the age group [6-76] years with clinical or radiological suspicion of mediastinal lesions referred from Departments of Medicine, Surgery and Pediatrics between September 2011 and October 2013 to the Department of radio-diagnosis, Vydehi Institute of Medical Sciences & Research Centre, Bangalore for MDCT evaluation.

Results: The study included 36 cases of benign lesions and 14 malignant lesions. Cases of mediastinal lesions were found between age groups 6 and 76 years. All 50 cases were verified histopathologically. Diagnostic accuracy of 92% and 84% was seen for benign and malignant lesions, respectively.

Conclusion: With the high rate of diagnostic accuracy, MDCT plays a significant role in the assessment of various mediastinal pathology. The maximum number of cases occurred in 4th-6th decade. Anterior mediastinum was the most common compartment to be involved (52%) followed by posterior mediastinum (30%). MDCT definitely has a major role to play in the evaluation of a mediastinal mass regarding diagnosis, distribution pattern and mass effect on adjacent structures.

Key words: Benign, Malignant, Mediastinum, Multi-detector row computed tomography

INTRODUCTION

Computed tomography (CT) is a new method of forming images from X-rays. It was developed and introduced into clinical use by the British physicist Godfrey Hounsfield in 1972. It had a tremendous impact in the field of diagnostic radiology. The introduction of multi-detector

row CT (MDCT) into clinical practice in 1998 constituted a fundamental evolutionary step in the development and ongoing refinement of CT imaging techniques. This promising three-dimensional (3D) imaging tool allows substantial anatomical volumes to be routinely covered with isotropic sub-millimeter spatial resolution.¹ The ability of high-resolution MDCT scans to precisely localize lesions and biopsy needles, along with the delineation of adjacent structures, diagnostic fine-needle aspiration for both benign and malignant disease processes has become a quite safe and highly accurate procedure.²

The mediastinum is an extremely complex and interesting area of the body. The multitude of diseases affecting the

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mediastinum vary considerably, ranging from tumors (benign to extremely malignant) cysts, vascular anomalies, lymph node (LN) masses, mediastinitis, mediastinal fibrosis, and pneumo-mediastinum.³ Hence, every possible effort has to be made to arrive at a specific diagnosis at the earliest. Although conventional radiographs can now show recognizable abnormalities in many patients with mediastinal abnormalities, radiographs are limited in their sensitivity and ability to delineate the extent of mediastinal abnormalities and the relationship of masses to specific mediastinal structure.⁴ With the CT these problems are overcome because of its excellent density resolution and tomographic format helping the clinicians and radiologists in identifying the precise location, extent, and characterization of these masses.⁵ Cross-sectional imaging of the mediastinum by CT demonstrates precise anatomic details and is the imaging modality of choice for most of the mediastinal lesions.⁶⁻⁸ This study was done to evaluate the primary mediastinal mass lesions on MDCT by correlating the MDCT findings with histopathology, differentiating between benign or malignant mass lesions and to characterize the mediastinal lesions by MDCT.

The differential diagnosis of a mediastinal mass on CT is usually based on several findings, including its location, identification of the structure from which it is arising, whether it is single, multifocal or diffuse, its size and shape, its attenuation, the presence of calcification and its character and amounts, and its opacification following contrast administration.^{9,10} In this study, all the cases were subjected to MDCT evaluation for better characterization, extent, probable tissue of origin, and effect on adjoining structures. Plain and contrast studies were performed. The present study comprised of 50 patients.

MATERIALS AND METHODS

All patients referred to Department of Radio-Diagnosis, VIMS & RC between September 2011 and October 2013 with clinical suspicion of mediastinal space occupying lesions or who had a chest radiogram with a suspicious mediastinal abnormality were included in the study. Thorough clinical history and clinical examination was done before CT examination. All the cases taken up for the CT were evaluated for the distribution, MDCT features of the mediastinal mass and also the involvement of adjoining structures. Vascular lesions arising from aorta and cardia, traumatic causes and various types of hernias were excluded from the study.

CT images were obtained with general electrical medical systems 16 slice MDCT machine with 5 mm collimation; 0.6 mm reconstruction interval, gantry rotation speed

of 0.6 s, pitch of 1.375:1, 120 kV, and 350 mA were a constant feature for all cases. Routine anteroposterior to program of the thorax was initially taken in all patients in the supine position with the breath held. An axial section of 10 mm thickness was taken from the level of thoracic inlet to the level of suprarenals. In all cases, plain scan was followed by contrast scan. For contrast enhancement initially 80-100 ml of injection of iohexol or in a dose of 300 mg of iodine/kg body weight (in children) was given and axial sections were taken from thoracic inlet to the level of suprarenals.

Sagittal and coronal reconstructions were made wherever necessary. The magnification mode was commonly employed, and the scans were reviewed on a direct display console at multiple window settings (i.e., mediastinal window at 320/40; lung window 1400/-600; bone window of 2400/200) to examine the wide variation of tissue density and also to look for osseous involvement. The pre and post contrast attenuation values, the size, location of the mass, presence of calcification, mass effect on adjoining structures and others.

RESULTS

In the study, out of 50 cases, 30 cases (60%) were males and 20 cases (40) were females. Of 2 cases, 14 cases (28%) were children. Among them 8 were males (i.e., 57.2%) and 6 were females (i.e., 48.2%). The most common age group to present with the mediastinal mass was between 46 and 60 years (Table 1).

In present study of 50 cases, Cough was the most common clinical symptom constituting 44% followed by dyspnea 38%, fever 20% and chest pain 20%. In the study, out of 50 cases, 3 cases had no symptoms pertaining to the chest and CT showed the incidental involvement of the mediastinum (Graph 1).

In the study the anterior mediastinal masses formed the majority with 52% ($n = 26$) of the total masses (Graph 2). Among the anterior mediastinal masses 52% ($n = 26$), thymic masses formed the majority constituting 26.9% ($n = 7$), followed by metastatic LN 19.2% ($n = 5$) (Table 2). Middle mediastinal masses comprised of 18% ($n = 9$) of the total mediastinal masses. Among them the metastatic LN involvement formed the majority, i.e., 44.5% ($n = 4$) followed by tuberculosis (TB) LN enlargement constituting 22.2% ($n = 2$) (Table 3). Posterior mediastinal masses comprised 30% ($n = 15$) of the total mediastinal masses, the majority were contributed to neural tumors constituting 40% ($n = 6$) followed by paravertebral abscess constituting 20% ($n = 3$) (Table 4).

Table 1: Age and sex distribution

Age in years	Male		Female		Total	
	Number of cases	Percentage	Number of cases	Percentage	Number of cases	Percentage
0-15	8	57.2	6	42.8	14	28
16-30	3	37.5	5	62.5	8	16
31-45	4	57.2	3	42.8	7	14
46-60	11	73.3	4	26.7	15	30
>61	4	66.7	2	33.3	6	12
Total	30	60	20	40	50	100

Table 2: Anterior mediastinal lesions distribution

Mediastinal lesions	Number of cases	Percentage
Thymic masses	7	26.9
Metastatic LN	5	19.2
TB LN	4	15.4
Sarcoidosis	1	3.8
Lymphoma	6	23.2
Thyroid mass	2	7.7
Genu cell tumor	1	3.8
Total	26	100

LN: Lymph nodes

Table 3: Middle mediastinal lesions distribution

Mediastinal lesions	Number of cases	Percentage
Metastatic LN	4	44.5
TB LN	2	22.2
Neuroenteric cyst	1	11.1
Esophageal duplication cyst	1	11.1
Bronchogenic cyst	1	11.1
Total	9	100

TB: Tuberculosis, LN: Lymph nodes

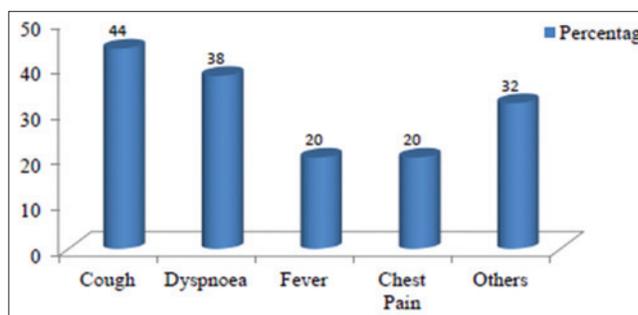
Table 4: Posterior mediastinal lesions distribution

Mediastinal lesions	Number of masses	Percentage
Neural tumors	6	40
Paravertebral abscess	3	20
TB LN	2	13.3
Esophageal mass	2	13.3
Extramedullary hemopoiesis	1	6.66
Lymphangioma	1	6.66
Total	15	100

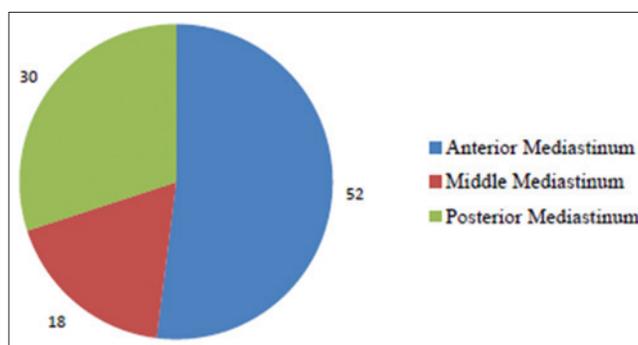
TB: Tuberculosis, LN: Lymph nodes

Among the thymic masses, thymoma constituted 42.8% ($n = 3$) and is seen predominantly in age group of 46-60 years and males outnumbered females in the ratio of 2:1. Thymic hyperplasia comprised 28.6% ($n = 2$) and was seen in the age group of 0-15 years. In the study of 6 cases of neurogenic tumors, neurofibroma constituted 50% ($n = 3$), ganglioneuroblastoma 16.6% ($n = 1$), schwannoma 16.6% ($n = 1$) and paraganglioma 16.6% ($n = 1$).

In the study, lymph nodal masses constituted 40% ($n = 20$) of the total mediastinal masses. Among these the metastatic LN involvement is the predominant constitutes 39.1% ($n = 9$) followed by TB LN enlargement 34.8% ($n = 8$).



Graph 1: Clinical symptoms distribution



Graph 2: Compartmental distribution of mediastinal masses

In the study, majority of the masses, showed heterogeneous enhancement, i.e., 44% ($n = 22$) followed by homogenous enhancement; 28% ($n = 14$) non enhancing masses constituted 12 ($n = 6$) (Graph 3).

In the study, majority were solid masses constituting 54% ($n = 27$) of the cases followed by solid and cystic masses in 22% ($n = 11$) of the cases (Graph 4). In the study, 24% ($n = 12$) of the cases showed calcification in the mediastinum mass (Graph 5). Mass effect was noted in 62% of the cases and was predominantly noted on the airways.

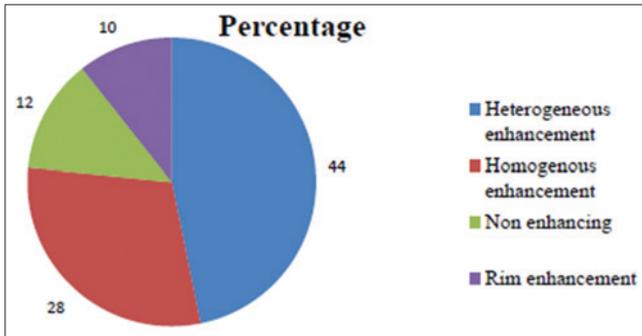
DISCUSSION

In present study of 50 cases, 35 of benign and 11 malignant cases correlated with histopathological examination (HPE), With the sensitivity of MDCT for evaluating the benign lesions is 95%, specificity is 91%, with a positive predictive value of 97% and for malignant lesions sensitivity 78%,

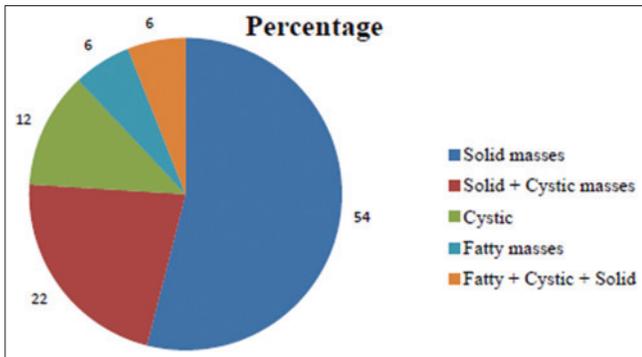
specificity is 33% positive predictive value of 84% (Table 5).

The present study did not correlate with HPE in 4 cases (Table 6). In one case, the diagnosis of mediastinal lipomatosis was given on MDCT, but histopathological diagnosis was thymolipoma. Both these entities have similar findings on CT, except that thymolipoma has soft tissue strandings within the fat density lesion suggestive of thymic tissue.⁸ One case was diagnosed as tubercular LN on MDCT, histopathological diagnosis was metastatic LN. The node showed peripheral rim enhancement with

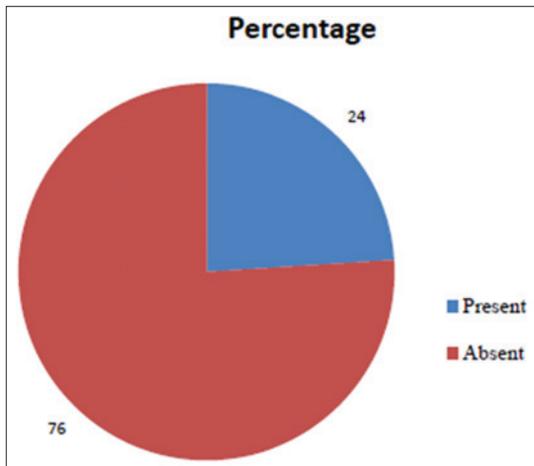
central area of hypodensity (necrosis) (Figure 3). This is the feature seen both in tubercular and metastatic LN and can be difficult to differentiate unless calcification is seen.^{11,12} Another case, showed LN with homogenous enhancement and no egg shell calcifications on MDCT leading to the erroneous diagnosis of lymphoma rather than sarcoidosis. The absence of calcification can cause confusion between the two entities. One case of retrosternal mass with calcification was diagnosed as thyroid carcinoma on MDCT and histopathological diagnosis was goiter with benign nodular calcification. In the absence of infiltration into the adjacent structures and regional LN, benign entity should have been considered.



Graph 3: Computed tomography enhancement pattern of mediastinal masses



Graph 4: Distribution of the masses based on their attenuation



Graph 5: Number of masses with calcifications

In present study, granulomatous lesions constituted 16%, which is greater in comparison to Wychulis *et al.*⁶ study (i.e., 6.3%) probably due to the higher prevalence of TB in comparison to the western population. According to Im *et al.*⁹ series, right paratracheal LN enlargement was seen in 87% of cases whereas Present study showed 60% involvement. Similarly in Im *et al.*⁹ study, 52% of the TB LN enlargement showed central areas of low attenuation with rim enhancement on contrast study. The present study showed 40% involvement. The present study had 3 cases of paravertebral abscess (5.6%) which was associated with vertebral body destruction.

In present study, the thymic tumors formed the majority with 14%, which is similar to studies conducted by Cohen *et al.*¹¹ In a study by Chen *et al.*¹³ on 34 patients with CT diagnosis of thymic mass, thymoma constituted 42% and thymic cyst 2.9%. Whereas present study of 7 patients with thymic mass, thymoma constituted 42% and hemihyperplasia 28%. According to Naidich *et al.*,¹⁴ Thymoma is most common seen between 50 and 60 years that is comparable to this study in which the 3 patients with thymoma were of age 40, 48 and 48 years, respectively.

Intrathoracic goiters are also common cause of mediastinal enlargement. Thyroid masses account for 11-15% of mediastinal masses.¹⁵ In the present study, they represented only 4% of the cases.

MDCT Characteristics of Mediastinal Masses

The normal thymus conforms to the shape of the adjacent vessels on CT, whereas a thymic mass does not intend to. Furthermore, a mass gives rise to focal swelling, usually centered away from the midline, whereas the normal gland is approximately symmetrical.

Thymic cyst

Congenital are typically unilocular, contains clear fluid of water density with a thin wall usually <6 cm in diameter. Acquired are usually multilocular, wall of variable thickness

Table 5: CT diagnosis and final diagnosis

Mediastinal lesions	Final diagnoses	Percentage	CT diagnosis	Percentage
Bronchogenic cyst	1	2	1	2
Mediastinal LN with carcinoma lung	9	18	8	19
Esophageal duplication cyst	1	2	1	2
Esophageal mass	2	4	2	4
Germ cell tumor	1	2	1	2
Paraganglioma	1	2	1	2
Lymphangioma	1	2	1	2
Lymphoma	6	12	7	14
Neuroblastoma	1	2	1	2
Neuroenteric cyst	1	2	1	2
Neurogenic tumor	4	8	4	8
Paravertebral abscesses	3	6	3	6
Extramedullary hemopoiesis	1	2	1	2
TB LN	8	16		18
Retrosternal goitre	1	2		
Thymic cyst	1	2	1	2
Thymic hyperplasia	2	2	2	4
Thymolipoma	1	2		
Thymoma	3	6	3	3
Sarcoidosis	2	4	1	2
Mediastinal lipomatosis			1	
Carcinoma thyroid			1	
Total	50	100	50	100

CT: Computed tomography, TB: Tuberculosis, LN: Lymph nodes

Table 6: Correlation with histopathology

CT diagnosis	Histopathologic diagnosis	HPE benign	HPE malignant
Thyroid CA	Benign nodule	+	
Mediastinal lipomatosis	Thymolipoma	+	
TB LN	Metastatic LN	-	+
Lymphoma	Sarcoidosis	+	-

CT: computed tomography, HPE: Histopathological examination, TB: Tuberculosis, LN: Lymph nodes

and range in size from 3 to 17 cm in diameter, sometimes septations and calcification of the cyst wall may be seen.¹⁶

Thymoma

On CT, thymomas appear as homogenous soft tissue density masses, which are usually sharply demarcated and oval, round or lobulated in shape, project to one side of the mediastinum, and do not conform to the normal shape of the thymus (Figure 1). Rarely, cystic with discrete nodular components, except in patients with cystic masses, thymomas usually enhance homogeneously and not uncommonly may contain calcium. Pleural implants may be present which are often unilateral and usually unassociated with pleural effusion. Large tumors have areas of hemorrhage, necrosis or cyst formation.

Thymic carcinoma

Thymic carcinoma cannot be distinguished from thymoma on CT unless enlarged LN are visible in the mediastinum or distant metastases are evident.¹⁷ On CT, seen as homogenous soft tissue mass or heterogeneous with areas

of cystic necrosis. Calcification is seen in 10-40% cases. Obliteration of fat planes and extension into pericardium and pleura is usually seen.

Thymolipoma

CT shows a fatty mass with varying amounts of intermixed soft tissue representing thymic tissue. Sometimes it is predominantly fatty so that it is impossible to distinguish a thymolipoma from a mediastinal lipomatosis.¹⁸

Germ cell tumors

Germ cell tumors include benign and malignant teratoma, seminomas, embryonal carcinoma, endodermal sinus (yolk sac) tumor, choriocarcinoma, and mixed types.

Teratoma

MDCT often shows combination of fluid filled cysts, fat, soft tissue and areas of calcification (Figure 5). Calcification seen in 20-80% of cases, being focal, rim like, or rarely representing teeth or bone. A fat fluid level is particularly diagnostic. Cystic teratoma characteristically has a thick wall, soft tissue septations and in homogenous areas approaching fatty attenuation values, within a predominantly near water density mass; differentiates from other benign cysts.⁵

Seminoma

Typically, primary mediastinal seminomas are large, smooth or lobulated, homogenous soft tissue masses, although small areas of low-attenuation may be seen. Obliteration of fat planes is common and pleural or pericardial effusion may be present.

Non-seminomatous germ cell tumors: On MDCT, these tumors usually show heterogeneous opacity, including ill-defined areas of low attenuation secondary to necrosis and hemorrhage or cystic areas. They often appear infiltrative, with obliteration of fat planes and may be spiculated calcification may be seen.

Thyroid masses

The MDCT appearance of a mediastinal goiter is variable, but the goiter can confidently diagnosed when continuity of the mass with the thyroid is visible. MDCT is at greatest value in defining the morphologic extent. Marked irregularity of the gland contour, loss of distinct mediastinal fascial planes and/or presence of cervical or mediastinal adenopathy should signal potential malignancy.¹⁹

Parathyroid adenoma

When visible on CT, they usually appear homogenous in density. In anterior mediastinum, they may be indistinguishable from small thymic remnants, small

thymomas or small LN and are usually found in the expected location of the thymus. CT correctly identifies parathyroid adenoma preoperatively in 81% of patients.²⁰

Primary mediastinal lymphoma (PML)

An anterior mediastinal mass often associated with enlarged nodes in the middle and posterior mediastinum, PML often affects extrathoracic sites at time of diagnosis particularly abdomen, head and neck.

On CT Hodgkin's lymphoma is characterized by the presence of a discrete anterior and superior mediastinal mass with surface lobulation. Surface lobulation of main mass is due to involvement of multiple nodes and coalescence. Masses typically exhibit homogenous soft tissue attenuation, while large tumors may exhibit heterogeneity with complex low attenuation representing necrosis, hemorrhage, and cystic degeneration. It commonly involves cervical, mediastinal, hilar, and paraaortic nodes.²¹

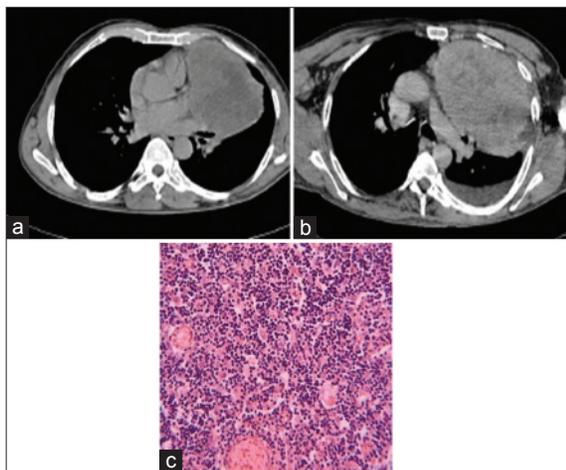


Figure 1: (a and b) Computed tomography images of thymoma, (c) histopathology slide 1: Thymoma

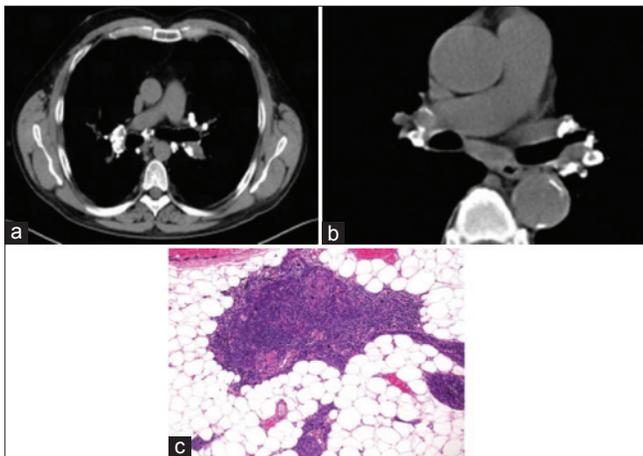


Figure 2: (a and b) Computed tomography Images of sarcoidosis, (c) histopathology slide 2: Sarcoidosis

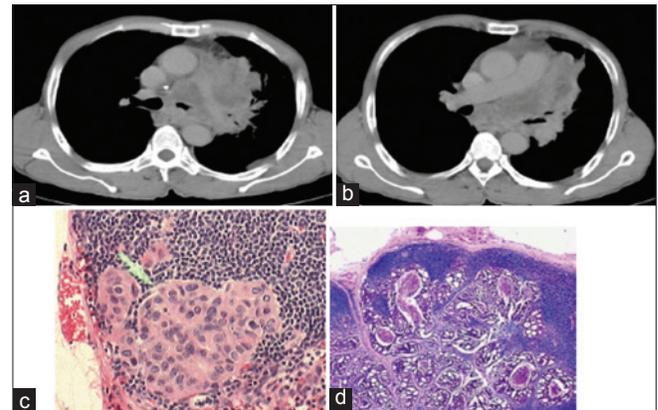


Figure 3: (a and b) Computed tomography Images of mediastinal lymphadenopathy due to carcinoma lung, (c) histopathology slide: Metastatic deposit from adenocarcinoma

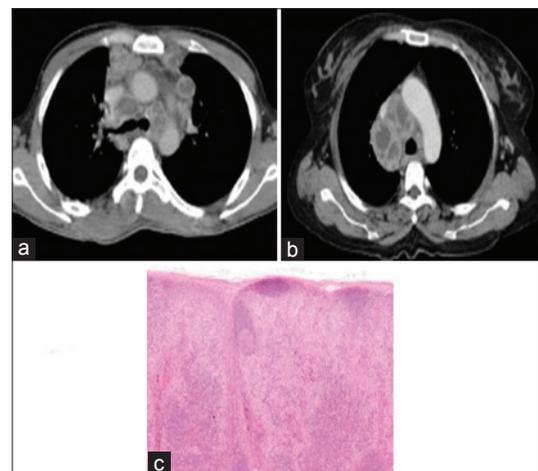


Figure 4: (a and b) Computed tomography of tubercular lymphnodes, (c) histopathology slide 4 – tubercular lymphadenitis

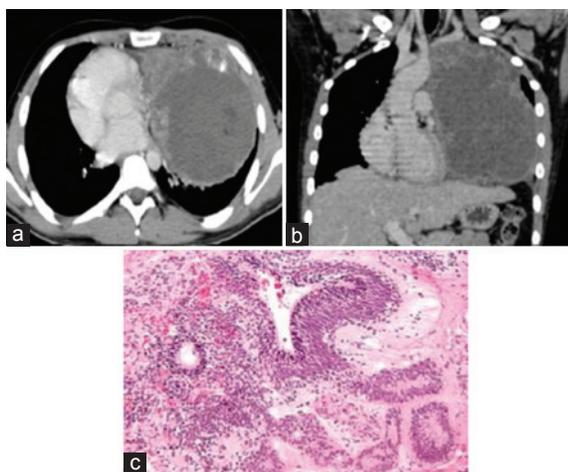


Figure 5: (a and b) Computed tomography images of germ cell tumor with calcifications, (c) histopathology slide 5 - germ cell tumor

Non-Hodgkin's lymphoma comprises of mediastinal large B-cell lymphoma and lymphoblastic lymphoma and is more common in children than Hodgkin's lymphoma. Large cell lymphomas are typically confined to the mediastinum and contiguous nodal areas initially without showing extrathoracic disease at presentation. It may present with hematogenous spread to kidney, liver, ovary, adrenal gland, GI tract, and central nervous system during disease progression or at recurrence. CT demonstrates mediastinal mass without surface lobulation, often associated with vascular involvement and pleural or pericardial effusion. Lymphoblastic lymphoma is characterized by mass without surface lobulation involving vascular structures often associated with pleural and pericardial effusion, systemic nodal involvement including cervical, axillary, para aortic, mesenteric and inguinal groups and by hepatomegaly and splenomegaly.²²

Sarcoidosis

In the order of decreasing frequency, paratracheal, aortopulmonary, subcarinal, and prevascular LN are commonly involved.²³ LN shows dense or stippled or egg shell calcification and rarely enhance or appear necrotic (Figure 2).

TB

The enlarged LN usually shows central area of low attenuation on MDCT with peripheral enhancement (Figure 4).

Pleuropericardial cyst

MDCT shows thin walled unilocular water density (0-20 HU) cystic structure. Wall may calcify. Majority of them arises in the anterior cardiophrenic angle, more so on the right side.²³

Bronchogenic cyst

MDCT typically shows sharply marginated thin walled mediastinal mass of homogenous soft tissue or water attenuation. Rarely, calcification of the cyst wall is present. When dense, bronchogenic cysts may be difficult to distinguish from solid lesions. An important clue can be their lack of enhancement following contrast administration.²⁴

Esophageal duplication cysts

On MDCT indistinguishable from bronchogenic cyst except for the location.

Neuroenteric cysts

MDCT appearance is same as that of other duplication cyst, but the presence of vertebral abnormality points to the diagnosis, vertebral anomalies are present in half of the cases.

Lymphangiomas

MDCT usually shows a smooth, lobulated mass, which may mold to or envelop, rather than displace, the adjacent mediastinal structures. They are either unilocular or multilocular with near water density. Calcification is rare. Thin enhancing septations within the mass may be seen.²⁵

Neurogenic tumors

At CT, many neural tumors have mixed density, including low attenuation region, on non-contrast enhanced CT Schwannoma often demonstrate lower attenuation than skeletal muscle because of their high lipid content, interstitial fluid and areas of cystic degeneration. Neurofibromas are often more homogenous and show higher attenuation than schwannomas because they have fewer of these histologic features. These lesions are heterogeneously enhancing following contrast administration.

Plexiform Neurofibromas are seen in association with neurofibromatosis-1, on CT demonstrates low attenuation infiltrative masses along the mediastinal nerves and sympathetic chain.

Mediastinal paragangliomas

Rounded soft tissue masses which are usually extremely vascular and therefore enhance brightly Paravertebral lesions.

Tuberculous paravertebral lesions

CT scan is excellent for visualization of endplate destruction, fragmentation of the vertebrae, and paravertebral calcifications. Inflammatory collections and masses are best seen after the contrast administration. Small necrotic foci are recognized by CT scans but are difficult to find in the conventional radiographs. Extension into the

canal of epidural abscesses and bony fragments are well demonstrated on axial CT images. MDCT is also used for guiding percutaneous biopsy and postdrainage follow-up.

Extramedullary hemopoietic tissue

Extramedullary hematopoietic tissue typically produces one or smoother, lobular, spherical masses in the paravertebral gutter, usually in the lower thorax, often they are bilateral and symmetrical. Extramedullary hemopoietic tissues are low-density masses due to fat content.

Esophageal carcinoma

Narrowing of the esophageal lumen or dilatation caused by obstruction. Thickening of the esophageal wall, either symmetric or asymmetric. Loss of periesophageal fat planes, with or without evidence of invasion of surrounding organs.

CONCLUSION

MDCT plays a significant role in the assessment of various mediastinal pathology with an accuracy of 92% on the whole, 97% and 84% for benign and malignant lesions, respectively, MDCT is a promising 3D imaging tool which allows substantial anatomical volumes to be routinely covered with isotopic sub-millimeter spatial resolution highly useful for the investigation of mediastinal masses. MDCT definitely has a major role to play in the evaluation of a mediastinal mass lesions regarding their characterization and differentiating between benign and malignant lesions.

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Correlation of Magnetic Resonance Imaging and Bone Scintigraphy in Stress Injuries of Lower Extremities Bones

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Abstract

Introduction: Stress fracture of foot and long bones of leg is a common disability. The problem of “stress fracture” is clinically significant amongst armed forces and athletes due to the high standard of training imparted in the various military regimental training centers and academies. This study was undertaken to compare findings of scintigraphy and magnetic resonance imaging (MRI) in early detection of stress injuries of the bone when radiography findings were normal or inconclusive.

Purpose: We undertook a prospective study of symptomatic patients who were referred to Department of Radiology, Command Hospital Air Force, Bengaluru, Karnataka, India, from various military units with history of prolonged exertion and clinical suspicion of stress injury.

Methodology: In this prospective study, 50 consecutive patients with suspicion of stress injuries of bone and with negative radiographs were selected for the study from May 2006 to June 2009. Scintigraphy and MRI were performed on the same day or within 4 days and the findings were compared for correlation accuracy of MRI and scintigraphy.

Results: In all patients, both scintigraphy and MRI indicated stress injury of bone. On Evaluation of MRI for grades of bone stress injury in relation to bone scintigraphy findings. There is good agreement between MRI and bone scintigraphy and with a strong *P* value ($P < 0.001$). Compared with scintigraphy, MRI showed more diagnostic information, such as fracture line, periosteal and soft tissue edema.

Conclusion: From these observations, we conclude that MRI provides more diagnostic information than scintigraphy and is recommended as the diagnostic and assessment tool in early stages of stress injury of bone.

Key words: Bone scintigraphy, Magnetic resonance imaging, Radiography, Stress fracture

INTRODUCTION

Stress fracture is a common disability amongst Armed forces personnel especially in military recruits due to high standard of training imparted in the various military regimental training centers and academies.¹

It is a frequent cause of discontinuity in training. It results in loss of training time to the recruit, loss of man-hours,

trained manpower and financial loss to the organization. It also affects the morale of the recruit and trained manpower which is unquantifiable.²

Stress fractures or fatigue fractures were originally reported by Breithaupt, Military Surgeon in Prussian army recruits in 1855. He described a syndrome of painful swollen feet amongst soldiers after long marches as “March fracture” the stress fractures in the metatarsals.² Using conventional radiography, these signs and symptoms were first reported as stress fractures in 1897. Stress fractures are most common noted in the lower extremities, these injuries also occur in the upper extremities, ribs, spine, and pelvis.³ Clinical evaluation of stress fractures includes a thorough history, a physical examination, and imaging studies. The recent advancement of musculoskeletal imaging techniques has aided the evaluation and diagnosis of stress-related

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injuries. Standard management of stress fractures consists of pain-free crutch ambulation for lower extremity stress fractures followed by a gradual return to weight-bearing activity culminating in running.⁴

Pathophysiology

The stress fractures are caused by continuous and repetitive muscular pulling on the normal bone, resulting in a disruption of the periosteum and the underlying bone, at the origin or insertion of a given muscle.⁵ Stress fractures are in a very real sense a microfracture secondary to intense muscle contraction.⁶ Unaccustomed prolonged and excessive physical activity that causes resorption of bone in excess of repair and bone formation in certain regions can also result in stress fractures.

Overuse or fatigue stress fractures

It is clinically described in military recruits and runners in whom normal bone is exposed to repeated abnormal stress.⁶

Types of overuse stress fracture are compression type and distraction type. This is subdivided as transverse, longitudinal and oblique. The transverse fracture is more dangerous and this type is known to cause a complete fracture if not diagnosed at an early stage and properly treated. The common locations of stress fractures are the tibia, fibula, metatarsals, calcaneum, and navicular bones. It can also occur at rare sites such as pubic-ramus, pubic symphysis, spine, femoral neck, femoral diaphysis, distal shaft of humerus and proximal ulna.^{7,8}

The main modality for investigating of stress fractures at the initial stage is the plain X-ray which is easily available at all primary health care centers. Sometimes, the plain radiographic findings of stress fracture are difficult to interpret and may even be normal in early stages. Hence, there is a high possibility of missing early stress fractures which can further lead to complete bone fracture if the part is not rested, and the patient continues his rigorous training activity. In recent years, newer techniques such as scintigraphy and magnetic resonance imaging (MRI) enable for timely and accurate diagnosis and treatment of stress fractures, thus preventing significant morbidity.⁹

This study was undertaken to compare the efficacy of bone scintigraphy and MRI in the diagnosis of stress injuries of lower limb bones in those symptomatic patients whose initial plain radiographs were negative for stress injuries and recommend the best imaging modality for early detection of stress injuries of bone.

METHODOLOGY

The study was conducted on 50 patients of suspected stress injuries of lower limb bones, in the age group of

18-32 years who were referred to Radiology Department, Command Hospital (Air force), Bengaluru and whose initial plain radiographs were negative for stress injuries. The study was conducted from November 2006 to June 2009.

Inclusion criteria included apparently healthy individuals belonging to the armed forces presenting with history of prolonged repetitive exertion and reporting with pain. Exclusion criteria included acute direct trauma to the bones and metabolic bone diseases. Patients with negative X-rays were subjected to MRI and bone scan according to the following protocols:

MRI equipment used for study was Siemens Magnetom Avanto 1.5 tesla. The following imaging protocol was followed fast spin-echo (SE) short-tau inversion-recovery (STIR) (TR, 2400-3600; TE, 20-40; inversion time, 80-100 m) T1- weighted (T1W) SE imaging (repetition time [TR], 500 m; echo time [TE], 25 m) and T2-weighted (T2W) SE imaging (TR, 3000; TE, 100) using the above sequences coronal images of the effected region were obtain after application of surface coil.

MRI

Study was evaluated for: (a) Marrow changes of edema/contusion, (b) cortical/periosteal changes (Table 1).¹⁰

Scintigraphy

The patient was injected with 20 mCi of ^{99m}Tc-methyl diphosphonate intravenously. Anterior and posterior whole body images were acquired using dual head Siemens E-cam Gamma Camera 3 h after injection. If abnormalities seen in whole body image require detailed evaluation, further spot views of particular areas were taken.

Scintigraphy study was evaluated for: Increase uptake of tracer at the involved bone (Table 2).¹¹

Comparison of scintigraphy and MRI findings and gradings were done with Chi-square test and Fisher Exact Test.

Statistical Methods

Descriptive statistical analysis has been carried out in the present study. Chi-square/Fisher exact test has been used to find the significance of correlation of examination and results. Kappa Statistic has been used to find the significance of agreement between the bone MRI and scintigraphy findings. Diagnostic statistics *ni*: sensitivity, specificity, positive predictive value, negative predictive values, accuracy was used to correlate the findings of MRI with bone scintigraphy.

Kappa statistic for agreement

Inter-rater agreement statistic (Kappa) to evaluate the agreement between two classifications on ordinal or nominal scales (Cohen, 1960). Agreement is quantified by

the Kappa (K) or weighted Kappa (Kw) statistic: K is 1 when there is perfect agreement between the classification system; K is 0 when there is no agreement better than chance; K is negative when agreement is worse than chance.

Value of K/strength of agreement: $P < 0.20$ - Poor, $P = 0.21-0.40$ - Fair, $P = 0.41-0.60$ - moderate, $P = 0.61-0.80$ - Good, and $P = 0.81-1.00$ - Very good.

RESULTS

In this prospective study of 50 patients, the age distribution of patients studied (Table 3). The age range varied from 18 to 32 years, the mean age was 21.68 years. The maximum number of patients was in the age group of 21-25 years constituting 52%. The least number of patients who developed stress injuries were more than 25 years old.

Duration of exertion in days of patients studied (Table 4). The average duration for stress injuries to develop during the training period was 28.1 days. The maximum number of patients to develop stress injuries was seen from 11 to 20 days who were subjected to an acclimatized training. The least number of patients who developed stress injuries had undergone more number of gradual acclimatized training days.

Table 1: Grading of stress fracture of bone on MRI

Grade 0	Normal
Grade 1	Positive on STIR
Grade 2	Positive on STIR plus positive on T2WI
Grade 3	Positive on T1WI and T2WI, but without cortical break
Grade 4	Positive on T1WI and T2WI fracture line

STIR: Short-tau inversion recovery, T1W: T1-weighted, T2W: T2-weighted

Table 2: Grading of stress fracture of bone on scintigraphy

Grade 0	Normal
Grade 1	Irregular uptake and/or a poorly defined area of increased activity
Grade 2	Similar to Grade 1, but more intense yet still poorly defined
Grade 3	Sharply margined area of increased activity, usually focal or uniform in shape
Grade 4	Similar grade 3, but more intense uptake

Table 3: Age distribution of patients studied

Age in years	n (%)
18-20	20 (40.0)
21-25	26 (52.0)
>25	4 (8.0)
Total	50 (100.0)
Mean±SD	21.68±3.96

SD: Standard deviation

Studying the bones involved in patients (Table 5). The common bone involved was tibia. The right tibia was involved in 33 patients, followed by left tibia in 11 patients, femur in one patient (2%) and metatarsal in one patient (2%). The most common part of the tibia to be involved was proximal thirds of shaft.

On studying the region of fracture involved in bones (Table 6). The most common part of the tibia to be involved was proximal thirds of shaft. This pattern of injuries was observed more in recruits who underwent running and cross county pattern of training.

Scinigraphic results total patients - 50, Positive - 46, Negative - 04.

Additional findings - tracer up take was seen at asymptomatic sites in nine cases.

MRI results total patients - 50, Positive - 48, Negative - 02.

Additional findings - fracture line was seen in two cases

On correlating the findings of bone scintigraphy and MRI (Table 7). There is good agreement between bone

Table 4: Duration of exertion in days of patients studied

Duration of exertion in days	n (%)
Up to 10	10 (20.0)
11-20	22 (44.0)
21-30	7 (14.0)
31-50	4 (8.0)
51-80	5 (10.0)
>80	2 (4.0)
Total	50 (100.0)
Mean±SD	28.16±28.87

SD: Standard deviation

Table 5: Bone involvement of patients studied

Bone involvement	n (%)
Left femur	1 (2.0)
Left tibia	15 (30.0)
Right tibia	33 (66.0)
Metatarsal foot	1 (2.0)
Total	50 (100.0)

Table 6: Region of fracture of patients studied

Region	n (%)
Upper third tibia	22 (44.0)
Middle third tibia	18 (36.0)
Lower third tibia	8 (16.0)
Neck of femur	1 (2.0)
Meta tarsal	1 (2.0)
Total	50 (100.0)

Table 7: Correlation of findings of bone scintigraphy and MRI

Bone scintigraphy↓	MRI (%)					Total (%)
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	
Grade 0	0	4 (8.0)	-	-	-	4 (8.0)
Grade 1	1 (2.0)	15 (30.0)	-	-	-	16 (32.0)
Grade 2	1 (2.0)	1 (2.0)	13 (26.0)	-	-	15 (30.0)
Grade 3	-	2 (4.0)	1 (2.0)	9 (18.0)	1 (2.0)	13 (26.0)
Grade 4	-	-	-	-	2 (4.0)	2 (4.0)
Total	2 (4.0)	22 (44.0)	14 (28.0)	9 (18.0)	3 (6.0)	50 (100)

Strongly significant kappa co-efficient of 0.699 ($P < 0.001$)

scintigraphy and MRI with kappa coefficient of 0.699 ($P < 0.001$).

On evaluation of MRI for grades of bone stress injury in relation to Bone scintigraphy findings. (Table 8) There is good agreement between MRI and bone scintigraphy and with a strong P value ($P < 0.001$).

DISCUSSION

The stress fractures can be diagnosed by following imaging modalities. Plain radiography, computed tomography (CT), ultrasound, skeletal scintigraphy, and MRI.

Radiography

Stress fracture of the bone can be effectively diagnosed on plain radiographs by taking two orthogonal views of the involved part to demonstrate the bony injury. In cortical bone, stress fractures are diagnosed based on the presence of endosteal reaction, periosteal callus without a fracture line or circumferential periosteal reaction with a fracture line through one cortex, sometimes frank fracture may be present. Generally for the periosteal reaction to develop it takes more than 3 weeks preceding the injury. In cancellous bone, stress fractures are poorly visible but sometimes may be appreciated as flake like patches of new bone formation 2-3 weeks after the onset of pain. The mineralized fracture site appears as a focal linear area of sclerosis oriented perpendicular to the trabeculae. While the location and nature of a fracture are usually readily demonstrated on radiographs, the status of the adjacent soft tissue is usually very difficult to assess. The conventional radiographs have a sensitivity of 15-35% in early fractures, which increases to 30-70% during later exams because of overt bone reaction.¹² Even though sensitivity of the conventional radiographs is very low, plain X-ray examination is mandatory as a first imaging study to detect an overt fracture or rule out differentials such as infection or malignancy. In the present study, plain X-rays were used as screening modality to exclude patients with in stress injury of bone.

CT

With the advent of multislice CT scanners, helical data acquisition is five times faster than sequential CT imaging.

Table 8: Evaluation of MRI in relation to bone scintigraphy findings

MRI grade	Sensitivity	Specificity	PPV	NPV	Accuracy	P value
Grade I	93.8	79.4	68.2	96.4	84.0	<0.001**
Grade II	86.7	97.1	92.9	94.4	94.0	<0.001**
Grade III	69.2	100.0	100.0	90.2	92.0	<0.001**
Grade IV	100.0	97.9	66.7	100.0	98.0	<0.001**

**Strongly significant $P \leq 0.01$, MRI: Magnetic resonance imaging, PPV: Positive predictive value, NPV: Negative predictive values

Using thin collimation with multiplanar reformats, bony and soft tissue injury can be easily demonstrated. In bone stress injuries, CT findings show cortical breach with surrounding endosteal and periosteal sclerosis however early marrow changes can be missed. Hence, the role of CT is mainly limited to differential diagnosis. CT plays an important role in diagnosing longitudinal stress fracture of the tibia, which is difficult to diagnose on plain radiographs. Fractures involving regions of complex anatomy such as spine and pelvis can be conveniently demonstrated on CT. The disadvantage of CT is that it involves excessive radiation exposure, in view of its limitations this modality was not included in our study.

Ultrasound (USG)

Evaluation of musculoskeletal injuries can be done using, higher resolution linear transducers of (7-12 MHz). Detail evaluation of the superficial structures such as Tendon, ligaments muscles and fractures can be made. Although USG is unable to penetrate cortical bone, the high reflective and very large acoustic impedance make it possible to assess the bone contour and cortical fracture.¹³ USG by its ability to visualize developing callus before radiographic changes are evident and can also be useful in assessing fractures after initial radiographs. USG avoids excessive radiation exposure is relatively inexpensive and give accurate measurements about the process of calcification.¹⁴

Skeletal Scintigraphy

Bone scintigraphy is an imaging technique used in the detection of stress injury of bones since 1970's as described by Geslien *et al.*, and Wilcox *et al.*, as it can demonstrate subtle changes in bone metabolism even

before seen on plain radiography. In this technique, the imaging is based on the detection of radiation emitted from a ^{99m}Tc - diphosphonate a radioactive radiopharmaceutical inside the patient as the phosphate compound gets incorporated into the new bone at the site of injury. Hod *et al.*: In a study conducted on female recruits of Israeli defense force has reported a sensitivity of 100% for stress fractures and bone scans of shin splint lesions occasionally show linear longitudinal uptake.¹⁵ However, bone scintigraphic findings of stress reaction are nonspecific. Some authors reported that 20-40% of the lesions seen on scintigraphs were asymptomatic.¹⁶ Although bone scintigraphy was considered to be the gold standard, false-negative bone scintigraphs have been reported by Milgrom *et al.*: Keene and Lash and Sterling *et al.*¹⁶⁻¹⁸ In our study, we observed four patients to be positive on MRI, which were not picked by scintigraphic imaging. The limitation of bone scans is that a positive scan may not be seen for 24 h following injury despite its high sensitivity, the specificity of bone scintigraphy is inferior to that of MRI because it cannot quantify the finer details of the lesion sometimes pathological conditions such as a tumors, infections, bone infarctions, or periostitis can also produce a positive finding. The scintigraphy, has a radiation risk were the radiation dose is equal to a dose of 2 years of background radiation.

MRI

The MRI on the human body was first performed in 1977 by Raymond Damadian. This landmark discovery has revolutionized the field of imaging. This breakthrough discovery in imaging has made an extraordinary difference in demonstrating the contrast between MR signals from normal and abnormal tissues. It can also demonstrate the nature and extent of injuries. Without moving the patient image acquisition with a variety of pulse sequences can be used for characterizing tissues. MRI is sensitive in detecting changes in bone marrow at all fractures sites even <24 h. Fracture on MRI is described on the basis of SE images emphasizing on T1 and T2 contrast. As compared to SE images STIR images provide superior contrast between normal and abnormal marrow. The MRI features on T1W SE images consisted of irregular intramedullary zones of hypointensity described as a band-like area of low signal intensity. On STIR images a corresponding zone of hyperintensity extending to the outer cortical margin can be seen. MRI using T2W SE and STIR sequences can consistently demonstrate prominent signal abnormalities at fracture sites including those in which radiographic signs are subtle. MRI is as sensitive, as but more specific than scintigraphy.¹⁹ In addition to changes in bone, it gives information about the surrounding soft tissues in all three dimensions. T2W and STIR- sequences are useful for detecting edema of cancellous bone, periosteum, and bone

marrow edema; however is this is a nonspecific finding and should be interpreted in correlation with clinical history. A fracture can be seen as lower signal intensity in the middle of the edema, but it is better seen as a low-density signal line involving the cortex on T1-images.

Ishibashi *et al.*: In a study conducted on 31 patients comparing scintigraphy and MRI for stress injuries of bone have reported a good correlation of Grades of scintigraphy and MRI as compared to scintigraphy MRI showed more diagnostic information.²⁰ In the present study, we also observed similar results in the patients studied. An illustration of few such representative cases, images for Case 1 are given as (Figure 1a-d) wherein bone scan revealed intense well defined areas of increase tracer uptake in middle thirds shaft of right femur, hypointense on T1W and T2W suggesting good correlation between bone scan and bone scintigraphy for Grade I stress fracture and the corresponding area appeared as hyper intense signal on STIR. In Case 2 images are given as (Figures 2a-d) wherein bone scan revealed sharply marginated area of increased signal intensity in upper third shaft of right femur and in middle third shaft of left femur. On MRI, STIR and T2W images, the corresponding areas appeared as hyperintense signal intensities, on T1W coronal revealed a hypointense band with cortical break on right side suggesting grade IV stress on right side and Grade II fracture on left side. Though there is a good correlation between bone scan and bone scintigraphy where the tracer uptake was clearly seen, MRI provides detailed information regarding marrow edema, cortical break and surrounding soft tissues.

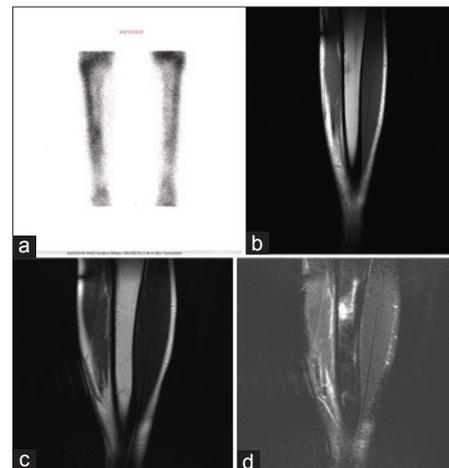


Figure 1: (a) Bone scan revealed intense well defined area of increase tracer up take in middle thirds shaftof right femur, (b) T1-weighted coronal magnetic resonance imaging (MRI) figure reveled normal signal intensities, (c) T2-weighted coronal MRI figure revealed normal signal intensities, and (d) short-tau inversion-recovery coronal MRI figures revealed focal area of hyper-intense intensity in middle third shaft of right femur. Diagnosed as case of Grade I stress fracture

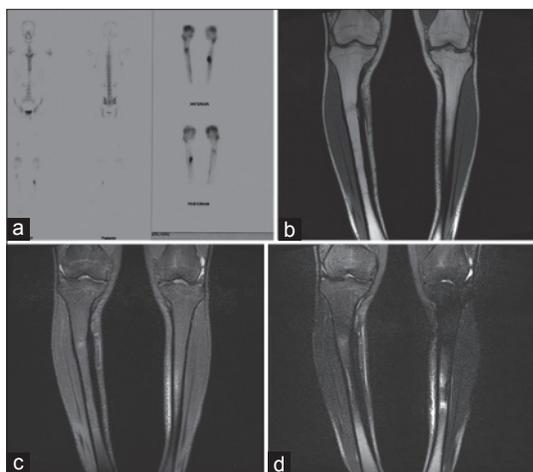


Figure 2: (a) Bone scan revealed sharply margined area of increased signal intensity in upper thirds shaft of right femur and also in middle thirds shaft of left femur, (b) T2-weighted coronal magnetic resonance imaging (MRI) figures revealed a hypo intense band with cortical break in right femur, (c) T2-weighted coronal MRI revealed hyper intense signal intensities in upper thirds shaft of femur on right side and middle thirds shaft of femur on left side, and (d) short-tau inversion-recovery coronal MRI figures revealed hyper intense signal intensities in the corresponding anatomical locations shaft of tibias. Diagnosed as Grade IV stress on right side and Grade II on left side

CONCLUSION

In our study, we observed a good correlation of findings between MRI and skeletal scintigraphy for stress injuries of bone with Kappa value of 0.699 ($P < 0.001$). On evaluation of MRI in relation to bone scintigraphy findings for grading of stress injuries, MRI has comparable sensitivity to scintigraphy for detection of stress fractures and MRI has additional advantage of depicting the surrounding tissue inflammatory process, as well as providing greater anatomical details. Hence, we recommend MRI as the initial imaging modality in early detection of stress injuries of bone.

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All the Staff, nuclear medicine department Command hospital Air force Bengaluru.

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Comparison of Latencies and Time to Stabilization of Pulse Oximeters at a Tertiary Health Care Facility

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Abstract

Introduction: Fingertip pulse oximeters are commonly used as non-invasive modes of measuring oxygen saturation (SpO₂) and heart rate (HR) in critical care units. In these cases, a shorter duration of time required obtaining the measurement and time to stabilization is crucial.

Objective: Our aim was to compare two new generation pulse oximeters with respect to latency in the first reading and time to stabilization of SpO₂ and HR.

Materials and Methods: This study was a prospective, comparative non-blinded, observational study of two fingertip pulse oximeters (Nonin Medical 9560 and CHOICEMMED MD300C1) in 20 in patients at Benedictine Health Center suffering from either one or more chronic diseases. SpO₂ and HR readings were collected at the time of first display, 30 s, 60 s and at the time of stabilization of the reading (no more than a 1% change in SpO₂, <3 bpm change in HR). Statistical analysis was performed with SAS 9.2 software.

Results: A total of 20 subjects were monitored. The average time to first reading across all fingers was significantly longer with the CHOICEMMED device (10.3 ± 0.8 s) as compared to Nonin Medical (9.0 ± 0.8 s) pulse oximeter. The mean difference was 1.3 s (95% confidence interval (CI), (0.05, 2.61), *P* = 0.04). The average time to stabilization of SpO₂ across all fingers was also statistically significantly longer in the CHOICEMMED (27.4 ± 2.2 s) than Nonin Medical pulse oximeter (11.4 ± 2.0 s). The mean difference was 15.9 s (95% CI (12.57, 19.29), *P* < 0.0001).

Conclusion: The pulse oximeter (Model 9560) by Nonin Medical showed shorter latency for first reading and time to stabilization when compared to CHOICEMMED (MD300C1), which is a distinct advantage in emergency situations in acute patients. Further larger studies are needed to validate these findings in different clinical settings.

Key words: Comparison, Hypoxia, Latency, Oximeter, Saturation

INTRODUCTION

Fingertip pulse oximeters are often used as a surrogate for measuring tissue oxygenation. They have proved to be useful tools in different hospital set-ups and even in challenging and adverse set-ups such as prehospital intubations and critical care in intensive care unit.¹⁻³ Use of fingertip pulse oximeters for efficient spot-check

assessment has increased with the greater availability of all-in-one portable devices.

In many clinical situations, the prompt availability of the result is as important as the value itself - for instance, in acute emergencies such as MI, anaphylactic shock, status asthmaticus or in ambulatory care when visits tend to be scheduled very frequently. In these cases, a shorter duration of time required to obtain the measurement is crucial.⁴⁻⁶ While pulse oximeters perform well in routine conditions, factors such as severe hypoxia, artifacts, latency to first reading, and time to stabilization of readings adversely affect their utility in challenging patient conditions.⁶

Time to stabilization of the pulse oximeter and latency of readings is of critical importance in scenarios such as

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rapid-sequence intubation, pre-hospital intubation, and checking oxygenation status in sudden cardiac status, when any delay can be counterproductive to the patient's prognosis.⁷⁻¹² These parameters depend on sensitivity of signal acquisition of the pulse oximeter, signal averaging time of the oximeter, site of measurement, perfusion status, motion artefacts, arrhythmias, and hemoglobinopathies.⁸⁻¹⁰

Some studies have focused on this critical aspect. Macleod *et al.* showed that latency of response to hypoxia might be markedly different depending on hypothermia, site of measurement and hypoxic challenge.³ Pulse oximeters use signal averaging time to obtain nonfluctuating measurement of oxygenation. Though signal averaging time in default mode is <10 s, it has been recommended that for finger pulse oximeters the time to stabilization and response to change in tissue oxygenation should be <30 s.^{3,4,7} However, many such studies have been based in hypoxia laboratories and may not be reflective of their performance in clinical scenarios.

Aim of the present study was to compare the time to stabilization and time to first reading of two pulse oximeters used at a tertiary Hospital center in challenging patient conditions, and infer about their performance under the same.

MATERIALS AND METHODS

Design

This study was a prospective, non-randomized, non-controlled, observational study. The study was designed to include up to 20 subjects. Pulse oximetry was done on these patients in resting condition.

Subjects who met the inclusion/exclusion criteria were asked to participate as a volunteer in the study. Informed consent forms were made available to interested participants. A study representative from Benedictine Health Center of Minneapolis was available to answer any questions. When the study representative felt that the subject understood the purpose, procedures, benefits, risks, discomforts, and precautions of the study, the subject was asked if they wanted to participate in the study and if so, the subject was asked to sign the appropriate informed consent. Each subject received a copy of the signed informed consent.

Following receipt and documentation of the IRB-approved informed consent, subjects were considered enrolled in the study. The demographic and anthropometric questions were completed.

Subjects were seated in a private location and had a reference pulse oximeter placed on their right little finger

for the entire duration of the procedure. If other limitations or conditions existed, preventing placement on the little finger, the reference oximeter was placed on the left little finger or not placed on this subject and indicated on the chronic renal failures.

A video recorder was used to monitor the study. The recording window was limited to the subject's hands. The following test procedure was used for each oximetry system on each digit:

1. Apply the pulse oximetry system to the application site (e.g., finger)
2. Record the time to first displayed measurement
3. Record the time to stable measurement (no more than a 1% change in oxygen saturation (SpO₂), <3 bpm change in pulse rate, or change in pulse strength)
4. Record the SpO₂ pulse rate, and pulse strength at first measurement, 30 s, 60 s, and stable measurement
5. Remove the sensor
6. Note special conditions during testing (e.g., imposed motion, patient motion, and device malfunctions) by marking the event in the collection system.

The order of placement and order of systems was randomized using a blocked randomization scheme with randomly sized blocks. The same application site was not used twice in a row. Each oximetry system was placed on each applicable location at least once during the testing.

For the extended stability and extend motion readings, the following procedure was performed:

1. Apply the test pulse oximetry system(s) to the application site (s) (e.g., finger)
2. Record the readings for a minimum of 10 min. Length of recording did not exceed 30 min.

Devices

The devices used in this study included pulse oximeters manufactured by Nonin Medical Model 9560 and CHOICEMMED MD300Cl.

The pulse oximeters used in this study were indicated for use in measuring, displaying, and storing functional SpO₂ of arterial hemoglobin and pulse rate. Pulse oximetry sensors used in this study included fingertip pulse oximeters.

Instructions for installation and use of the devices, including any necessary storage and handling requirements, preparation for use, re-use requirements, pre-checks of safety and performance, and precautions to be taken after use were provided where appropriate.

Statistical Calculation

Statistical analysis was performed with SAS 9.2 software (SAS Institute Inc., 2011. SAS System for Windows, Release

9.2. SAS Institute Inc., Cary, NC, USA) using generalized estimating equations to account for the correlation between multiple readings on the three fingers of the same subject.

RESULTS

A total of 21 subjects were enrolled in this study between February 28, 2011 and September 22, 2011 at Benedictine Health Care Center. One patient withdrew consent prior to study participation, while remaining subjects participated. Subjects were enrolled from both white and non-white races. Subjects weighed an average 86.36 kg and were 172.5 cm tall. The demographic features are described in Table 1.

Characteristics of Pulse Oximeters

Each of the subjects at Benedictine Health Center underwent simultaneous placement of a Nonin Medical Model 9560 and CHOICEMMED MD300CI on the index, middle and ring fingers. One device was placed on the particular finger (index, middle, or ring) on the left hand, and the other device was placed on the same finger of the contralateral hand. The order of the placement was assigned using a randomizations scheme such that no finger had a sensor placed twice in a row.

With each placement, data were collected by visual inspection of the oximeters. These data included SpO₂ and heart rate (HR) at first reading, 30 s, 60 s and stabilization. Time to stabilization and time to first reading were also recorded.

The average time to first reading across all fingers was significantly longer with the CHOICEMMED device

(10.3 ± 0.8 s, mean ± standard error) as compared to Nonin Medical (9.0 ± 0.8 s, mean ± standard error) pulse oximeter. The mean difference was 1.3 s (95% confidence interval (CI), (0.05, 2.61), *P* = 0.04). (Figure 1) The average time to stabilization of SpO₂ across all fingers was also statistically significantly longer in the CHOICEMMED (27.4 ± 2.2 s, mean ± standard error) pulse oximeter than Nonin Medical pulse oximeter (11.4 ± 2.0 s, mean ± standard error). The mean difference was 15.9 s (95% CI (12.57, 19.29), *P* < 0.0001). (Figure 2) There was no significant difference between time of first reading for HR (*P* = 0.09) and HR at stabilization (*P* = 0.37) between the two oximeters.

Study Flow

No follow-up was predicated or performed for this study. No adverse events were reported in this study. There were three protocol deviations. All three were deviations with respect to randomization order.

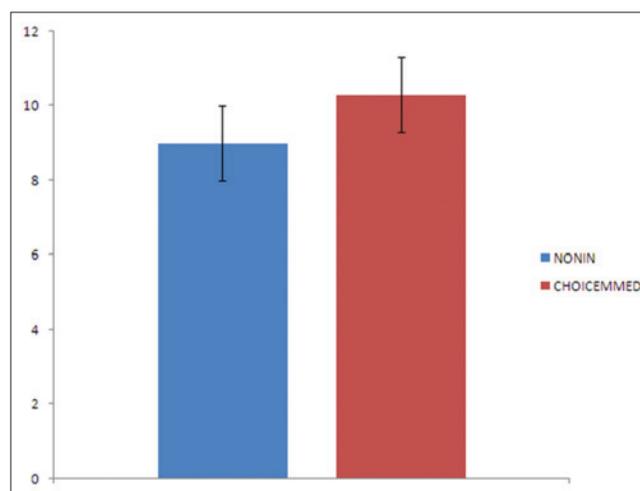


Figure 1: Comparative representation of time to first reading in both pulse oximeters in seconds

Table 1: Demographic variables of participants of the study

Characteristics	Benedictine Health (n=20 subjects)
Age	62±11.6
Gender (%)	
Male	14/20 (70)
Female	6/20 (30)
Race	
American Indian	1/20
Asian	0/20
Black	4/20
Pacific	0/20
White	15/20
Skin color	
Very light	4/20
Light	7/20
Intermediate light	5/20
Dark	4/20
Height (cm)	172.5±12.5
Weight (kg)	86.36±21.1

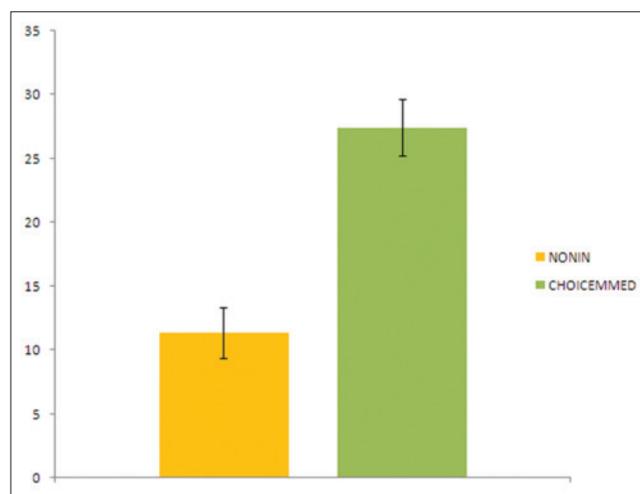


Figure 2: Comparative representation of time to stabilization in both pulse oximeters in seconds

DISCUSSION

During the study performance of two pulse oximeters under challenging patient conditions was evaluated. While both of the pulse oximeters achieved time to first reading and time to stabilization within 30 s, Nonin medical device outperformed CHOICEMMED device both in time to first reading and time to stabilization of SpO₂ by 1.3 s and 11.4 s respectively. These findings demonstrate that there is variability in performance of the pulse oximetry devices and future clinical validation must be carried out in various settings to verify claims made by manufacturers.

The average time to first reading across all fingers was significantly longer with the CHOICEMMED device (10.3 ± 0.8 s) as compared to Nonin Medical (9.0 ± 0.8 s) pulse oximeter. The mean difference was 1.3 s (95% CI, (0.05, 2.61), $P = 0.04$). The average time to stabilization of SpO₂ across all fingers was also statistically significantly longer in the CHOICEMMED (27.4 ± 2.2 s) pulse oximeter than Nonin Medical pulse oximeter (11.4 ± 2.0 s). The findings are in accordance with study of errors of pulse oximetry by Severinghaus *et al.* In a study by Macleod *et al.*, it was seen that forehead and ear sensors (central location) had up to six times faster responses to change in ventilation than fingertip oximeter. However, our study focused on fingertip pulse oximeters alone, because of the prevalence in practice which can lead to wider generalization of results. This study is unique in comparing the time to stabilization and first reading of Nonin Medical and CHOICEMMED pulse oximeter. While the Nonin device performed better than CHOICEMMED, we advocate testing these parameters in different challenging clinical settings.

Two major factors might affect the time to stabilization and time for first reading of pulse oximeters, first is proximity to large vessels. The probes which are central in location (forehead, ear, Nasal) and hence closer to great vessels consistently have shown faster response times.¹³⁻¹⁶ Signal averaging time also affects the time to stabilization of most pulse oximeters. Signal averaging time is a technique used by pulse oximeters to obtain nonfluctuating measurements. Most new generation oximeters have signal average time <10 s in default states, though they can be calibrated to lesser times as less as 3 s.^{14,15} In fact American sleep medicine guidelines recommend signal averaging time <3 s for pulse rate >80 beats/min or higher.¹³ Faster response time of the Nonin device might be attributable its better handling of artefacts, low perfusion filter and lower signal averaging times of <3 s at even lower pulse rates of 60 beats/min. Hypothermia, vasoconstriction and low gestation age can also affect time to first reading.¹⁵⁻¹⁷ However, our study was not aimed to detect performance of pulse oximetry in these situations. Similarly finger characteristics such

as deformity, nail pigmentation, and clubbing might also influence the response time. In our study, there was no significant difference in stabilization times across various fingers in both groups of pulse oximeters.

Our study has many strengths, it focuses on a clinically important parameter, which can be of value in situation where emergency assessment of tissue oxygenation is vital to management of rapid sequence and crash intubation.^{11,12,18} We also performed these measurements in 'real-world' clinical settings as opposed to hypoxia laboratories. We compared two new generation pulse oximeters to verify their claims. While both of these pulse oximeters had time to stabilization <30 s, Nonin's pulse oximeter performed significantly better. Some weaknesses of the study were open blinded assessment of comparisons. We could not account for more challenging situations like hypothermia and poor perfusion.^{19,20} We hope these lacunae would be taken care of in future studies.

CONCLUSION

We were able to assess the 'real world' performance of two pulse oximeters and determine vital clinical parameters of time to stabilization and time to first reading in both the groups. While time to stabilization was <30 s in both the groups. Nonin's device was almost 2.5 times faster in time to stabilization. The Pulse oximeter (Model 9560) by Nonin Medical showed shorter latency for first reading and time to stabilization when compared to CHOICEMMED (MD300C1), which is a distinct advantage in emergency situations in acute patients. Further, larger studies are needed to validate these findings in different clinical settings. We also recommend testing various pulse oximeters across different clinical settings and in other challenging conditions such as hypothermia, poor perfusion, sepsis, and with vasoconstrictors to enable wider generalization of clinical findings.

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Burst Abdomen: A Post-operative Morbidity

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Abstract

Introduction: Burst abdomen is a severe post-operative complication experienced by Surgeons and Gynecologist, who do a significant amount of surgery. Burst abdomen usually occurs due to various predisposing factors which can be prevented to some extent by having knowledge regarding them.

Purpose: The purpose of this study was to assess the patients, who had undergone laparotomy and developed burst abdomen.

Methods: The study was among 162 patients underwent laparotomy to know the occurrence of burst abdomen. The age of the study subjects was from 31 to 64 years. Pre-operative predisposing factors related to burst abdomen were also recorded. The clinical diagnosis of the patients was done such as physical examination, hematological investigations.

Results: Out of 162 patients treated, 16 developed burst abdomen with a percentage of 9.87%. Patients treated with emergency laparotomies was higher in number (15/102, i.e., 14.7%) while only one patient with elective laparotomy (1/60, i.e., 1.7%). The frequency of burst abdomen was significantly higher in older age group as compared to younger. The most common risk factors as malnutrition (20.3%), followed by obesity (12.5%), anemia (12.4%), wound infection (11.9%), coughing (9.6%), and distension (8.5%).

Conclusion: Burst abdomen is a serious complication of impaired wound healing. More studies are needed to spread knowledge about it to reduce its incidence.

Key words: Burst abdomen, Death, Laparotomy, Morbidity, Post-operative

INTRODUCTION

Burst abdomen is a severe post-operative complication experienced by Surgeons and Gynecologist, who do a significant amount of surgery. The frequency as described in the international data ranged from 0.4% to 3.5%.¹⁻³ and is also associated with a mortality rate in patients as high as 45%.⁴ While our country data stated still higher frequency of burst abdomen with overall rate of 4.8% and 6.6%.^{5,6}

Burst abdomen is associated with several factors which increases its incidence.⁷ Efforts have been made to conquer this difficulty with various innovations using

of different types of suture materials.⁸ A surgeon can perform a technically perfect operation in a patient, who is severely compromised by the disease process and still have a complication.

Various pre-operative factors which are predisposing to this unpleasant and tragic post-operative complication are studied.⁹ Because of high mortality rate due to burst abdomen in surgical operations. The management of these ranges from simple dressing to further closure of burst abdomen followed by a period of intensive care.¹⁰

The purpose of the present study was to assess the efficacy of closure of laparotomy incisions and its different predisposing factors.

METHODS

The present study was conducted among 162 patients underwent laparotomy by midline incisions in the Department of General Surgery and Obstetrics and

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Gynecology, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh, India. The age of the study subjects was from 31 to 64 years.

Inclusion and Exclusion Criteria

Patients undergoing emergency laparotomies were included in the study and patients with previous laparotomies were excluded.

The demographic profile of the patients was noted as age and gender. Further details regarding date of operation and discharge were observed also a detail history of the disease was taken. Other problems of the patients were also recorded as anemia, vomiting, coughing, distension, diabetes, hypoproteinemia, obesity, and malignancy, immunocompromised patients and wound infection. The clinical diagnosis of the patients was done like physical examination, hematological investigations, blood sugar, radiological investigations, and ultrasonography.

A prophylactic dose of antibiotics was given to all the study participants. All the cases were closed with non-absorbable monofilament, synthetic suture. Follow-up examination of wound was post-operatively onward.

RESULTS

A total of 162 patients treated with laparotomy through a midline incision during study. The mean age of patients was 47.32 ± 12.644 years. The number of male patients was 94 and female patients were 68 (out of which 48 females had pregnancy). A total of 102 patients with various pathologies were treated with emergency laparotomies while 60 were treated with elective laparotomies.

The study showed that out of 162 patients treated in this study, 16 developed burst abdomen with a percentage of 9.87%. Emergency laparotomies cases showed a higher number (15/102, i.e., 14.7%) while only one patient developed burst abdomen treated with elective laparotomy (1/60, i.e., 1.7%).

The frequency of burst abdomen was significantly higher in older age group as compared to younger. Regarding the severity of burst abdomen 47% of the patients had partial burst and 53% had complete burst. The occurrence of burst abdomen was almost higher in the older patients as compared to young ones as shown in Table 1.

All the patients with burst abdomen have most common risk factors as malnutrition (20.3%), followed by obesity (12.5%), anemia (12.4%), wound infection (11.9%), coughing (9.6%), distension (8.5%), immune compromised patients (7.4%), hypoproteinemia (7.1%), vomiting (5.7%),

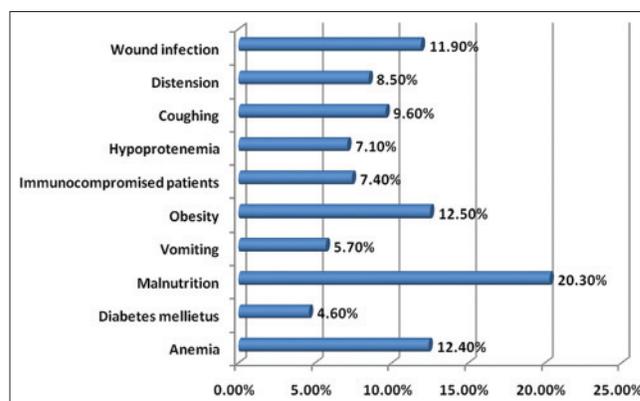
and diabetes mellitus (4.6%) as mentioned in Graph 1. The study also showed different pathologies as mentioned in Graph 2 showing tuberculosis abdomen (23.6%) as common cause, followed by obstruction due to post-operative band (18.5%) and obstetrical complications such as rupture uterus and obstructed labor (14.3%).

DISCUSSION

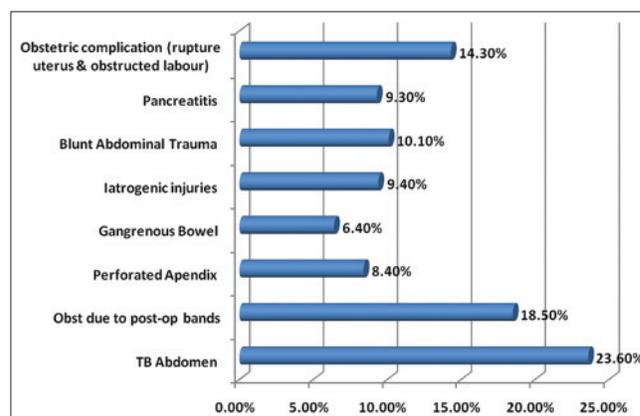
Burst abdomen is considered to be there when intestine or other viscera are seen through the abdominal wound after surgery (general and obstetric surgeries). It commonly occurs among patients on 6th-8th day after operation. There might be different factors relating to the occurrence of burst abdomen like suture material and technique, postoperative coughing and vomiting, distension,

Table 1: Age and percentage of study participants with burst abdomen

Age	Number of patients	Burst abdomen (%)
30-40	26	9.70
41-50	38	17.50
51-60	66	36.90
61-70	32	35.90



Graph 1: Frequency of predisposing factors in patients



Graph 2: Frequency of pathologies among patients

wound infection, obesity, hypoproteinemia, anemia, and immunocompromised conditions.¹¹

The frequency of burst abdomen in the present survey was 9.87% with a higher range than other studies which showed a frequency ranging from 5.3% to 8.3%.^{5,12} The incidence of burst abdomen is comparatively less in many Western studies which showed its occurrence as 0.4-3.5%. This may be attributable to poor nutritional status of patients, severe anemia hypoproteinemia, delay in presentation to tertiary health care hospitals, diseases, such as pregnancy with obstructed labor and rupture uterus, pancreatitis, tuberculous abdomen, and perforation peritonitis, among patients in the current study.

However, study done by Amini *et al.* in Pakistan showed high prevalence than the present data. It also showed that frequency of burst abdomen was higher following emergency laparotomies (14.89%) than elective laparotomy (2.7%).¹³

Similarly, our study showed higher frequency of burst abdomen in the cases done with emergency laparotomies than elective laparotomy. It is due to the fact that patients who undergo emergency surgery are generally in suboptimal condition and the chances of contagion of the surgical field are higher than in elective surgery. Furthermore, the concert of the surgeon might be affected that could lead to suboptimal closure of the abdomen at the ending of procedure.²

Some studies showed that elective and emergent laparotomy have also achieved a statistically similar risk.^{14,15} Indian authors have also reported burst abdomen occurrence from 10% to 30% of emergency cases.^{16,17}

Many patients undergoing emergency laparotomy suffer from one of these co-morbid conditions, detrimental to healing. It was observed profound necrosis of the aponeurotic layers of abdomen in these cases. Such necrotic linea alba does not hold sutures well which cut out with about of coughing or sneezing.

There are major risk factors for burst abdomen as malnutrition (20.3%), followed by obesity (12.5%), anemia (12.4%), wound infection (11.9%), coughing (9.6%), distension (8.5%), immunocompromised patients (7.4%), hypoproteinemia (7.1%), vomiting (5.7%), and diabetes mellitus (4.6%) in this study. Sinha *et al.* carried out a study in Oula University Hospital,¹⁸ among 48 patients who developed burst abdomen and found that 65% patients with pre-operative hypoalbuminemia, other risk factors included anemia, malnutrition, chronic lung disease and emergency procedure. In another study, 43.8% of patients showed hemoglobin <10 g% as the chief risk factor. Other

factors were poor nutritional status, obesity, diabetes mellitus, and hypoproteinemia.¹⁹

The maximum incidence of burst abdomen was seen within 7 days and these findings were in correlation to Parmar *et al.* study.⁹ In the present study, no mortality was seen in the case of burst abdomen, whereas mortality rate related to this surgery mentioned in the literature is 15-24%.²⁰ Fischer stated it to be 36%,²¹ while in a local study by Hanif *et al.* it was 50%.²²

CONCLUSION

Burst abdomen is a severe follow-up of impaired wound healing. Many factors can pre-dispose to this serious problem as anemia, hypoproteinemia, obesity, coughing, vomiting, distension, malnutrition and diabetes mellitus. Post-operatively it can be prevented by improving the nutritional status of the patient along with strict aseptic precautions and proper surgical technique.

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Pattern of Prostatic Lesions in Chhattisgarh Institute of Medical Sciences, Bilaspur: A Retrospective Tertiary Hospital Based Study

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Abstract

Introduction: Prostate gland is a very important source of male morbidity and mortality. Its prevalence varies from place to place with highest in African Americans and least in Asians. Its spectrum of diseases consists of inflammation, nodular hyperplasia to malignancy. All the diseases risks increases with age. Furthermore, new histological variants have come up with ongoing research on prostate since last few decades. New modality of diagnosis also has been developed comprising of radiological modalities and prostatic biomarkers. However, still histological diagnosis is mainstay for the final diagnosis.

Purpose: The present study was conducted to know the pattern of prostatic lesions around Bilaspur, Chhattisgarhi. It is situated in the central-east region of India and is predominantly a tribal belt.

Materials and Methods: The study period was from 2003 to 2014 in a tertiary level hospital and based on retrospective study. Total 215 prostatic samples were received in the department of pathology, out of which 195 were diagnosed as benign lesions, and 20 cases were found malignant. Benign prostatic hyperplasia (BPH) alone was the highest entity in benign category and adenocarcinoma of prostate in the malignant category. Routine stain used was hematoxylin and eosin.

Result: The highest age group presenting to us for benign prostatic lesions was 61-70 (83 cases) and malignant prostatic lesions (6 cases each) among 71-80 years age-group. The youngest patient presenting with prostatic lesion was 35 years, and oldest was of 95 years of age. Common lesion found was BPH. The prostatic cancer among overall malignancies was found to be 2.74% (20/729) during the study period.

Conclusion: The present study showed patterns of prostatic lesions in Central India which is a tribal belt. Neoplastic lesions are more common than non-neoplastic lesions. Among the histological types of prostatic lesions, BPH is predominant type, followed by BPH with prostatitis.

Key words: Adenocarcinoma, Neoplastic, Prostate, Prostatitis

INTRODUCTION

The prostate gland is the largest secondary male reproductive organ and weighs approximately 20 gms in a

normal adult. It is retroperitoneal organ and encircles the neck of the bladder and urethra. The prostate is an exocrine gland and forms a significant component of seminal fluid. Histologically it consists of glands lined by basal cuboidal cells and inner secretory columnar cells (double layered) and it depends on testicular androgen for its normal functioning. Important cause for prostatic morbidity and mortality includes inflammation, benign nodular enlargement and tumors. Benign prostatic hyperplasia (BPH) alone affects 210 million males worldwide, and it is so common in advanced ages that it can be considered as a part of normal ageing process.¹ BPH is the most common

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urologic disorder in men beyond 40 years of age group and is almost present in men aged 80-90 years of age group.² Furthermore, prostatic tumors are a very important cause of male morbidity and mortality and prostate cancer is second only to lung cancer among cancer-related deaths in men.³ Prostate cancer is responsible for 3% of all deaths in men above 55 years of age.⁴ The incidence of prostatic cancer increases rapidly with age than any other cancer. Its incidence varies from 8% in the 4th decade to 50% in the 5th decade and 75% in the 8th decade. Therefore, incidence of prostatic diseases including prostate cancer are expected to increase, as average life expectancy of men is increasing.^{5,6} There is a definite ethnic variation in its prevalence with most common in African-Americans followed by Scandinavians, Caucasians and least common in Asians.⁷

In India, prostate cancers constitute about 5% of all male cancers.⁸ Screening of prostatic lesions constitute prostate-specific antigen, digital rectal examination, and transrectal ultrasound, but biopsy remains the gold standard diagnostic tool for final diagnosis. Histological criteria for prostate cancer diagnosis are irregular growth pattern, nuclear atypia, high N/C ratio, increased mitotic index and absence of double layered epithelium.⁹ However, it becomes very challenging in the presence of benign mimickers, mixed with benign glands and limited tissue availability. Under such circumstances immunohistochemistry plays a valuable diagnostic role.¹⁰ Recent up gradation of our knowledge due to work of various authors on prostate in last two decades shows new variants of BPH, premalignant lesions as well as new histological variants and prognostic factors. High-grade prostatic intraepithelial neoplasia is considered as a premalignant condition of prostatic adenocarcinoma.¹¹ As most of the patients are of old age, therefore possible outcome of treatment versus treatment morbidity is the essential and hence accurate diagnosis and judicious management are essential. For this, many systems were developed but tumor, node, metastasis staging and Gleason's grading are universally accepted.¹² As there is no previous data from central-eastern part of India, where Chhattisgarh is located and mostly comprising of tribal population, therefore we have conducted this study to survey pattern of prostate diseases based on analysis of histopathological specimens received by Department of Pathology, Chhattisgarh Institute of Medical Sciences (CIMS), Bilaspur, a tertiary level teaching hospital. The data will be useful for planning and management of prostatic diseases especially cancer prostate in this tribal zone where mostly healthcare facilities are not optimum. The prostatic biopsies, total prostatectomy specimens and prostatic chips obtained by transurethral resection of prostate (TURP) forms a significant volume of surgical pathology material received in histopathology department

of our institute, accounting for 6.09% (215/3526) of all surgical specimens.

Aims and Objectives

The present study was conducted to determine histological patterns and age distribution of various prostatic lesions in Bilaspur zone of Chhattisgarh, a central-eastern state of India by studying formalin-fixed prostate specimens and to carry out detailed morphologic study of various prostatic lesions.

MATERIALS AND METHODS

The study was conducted in the Department of Pathology, CIMS a teaching institute and tertiary level hospital of government situated at Bilaspur, Chhattisgarh. The study period was from 2003 to 2014 and prostatic specimen data were collected retrospectively from archives of histopathology register. During this period, a total of 215 prostate specimens were received, fixed in 10% neutral buffered formalin immediately. Three types of prostate tissue biopsy were received-open prostatectomy, TURP chips and trucut needle biopsy. Tissue processing was done manually, followed by hematoxylin and eosin staining. The slides were examined under light microscope, and histopathological diagnosis was made.

RESULTS

Total 215 prostatic specimens were received during the study period. Out of rest 215 cases, 195 cases were benign and 20 malignant (Table 1 and Chart 1).

Histological subtypes showed predominantly BPH alone with 99 cases (46.04%) followed by BPH with chronic prostatitis in 82 cases (38.13%) among benign lesions. Adenocarcinoma prostate was predominant variant among malignant cases with 18 cases (8.37%) followed by transitional cell carcinoma with 2 cases (0.93%) (Table 2 and Chart 2).

The most common age group presenting with benign prostatic lesions was 61-70 years with 83 cases followed by 51-60 and 71-80 years age-groups. The common age groups affected mainly by malignant lesion were equally shared by

Table 1: Distribution of benign and malignant lesions

Histological types		Total
Benign	Malignant	
195	20	215

Table 2: Distribution of histological sub-types

Histological sub-types	Benign/borderline/malignant	Number of cases	% age (out of 215)
BPH alone	Benign	99	46.04
BPH with chronic prostatitis	Benign	82	38.13
BPH with acute on chronic prostatitis	Benign	3	1.40
Granulomatous prostatitis (including tubercular)	Benign	2	0.93
BPH with squamous metaplasia	Benign	4	1.86
Glandular hyperpasia only	Benign	2	0.93
BPH with urolith	Benign	1	0.47
Clear cell hyperplasia	Benign	1	0.47
Malakoplakia	Benign	1	0.47
Adenocarcinoma prostate	Malignant	18	8.37
Transitional cell carcinoma	Malignant	2	0.93
Total		215	100

BPH: Benign prostatic hyperplasia

Table 3: Age-wise distribution of cases

Age interval	Benign	Malignant	Total
≤30	0	0	0
31-40	2	0	2
41-50	17	1	18
51-60	46	5	51
61-70	83	6	89
71-80	40	6	46
81-90	6	2	8
91-100	1	0	1
Total	195	20	215

two groups between 61-70 and 71-80 with a contribution of 6 cases in each group. The youngest patient presenting with prostatic lesion was 35 years and oldest was of 95 years of age (Table 3 and Chart 3).

DISCUSSION

Total cases studied in pathology department from 2003 to 2014 were 3526, in which malignant cases were 729 (20.68%), and benign cases were 2797 (79.32%). Out of total biopsies received in Department of Pathology 20 (0.57%) cases found prostatic malignancies and 195 (5.53%) cases found benign prostatic diseases. The contribution of prostate malignancy in overall malignancies was found 2.74% (20/729). In the present study, age group affected with prostatic pathology was 35-95 years with mean age 66.08 similar to other Indian studies.¹³ The most common pathology encountered BPH and BPH with prostatitis 184 cases (85.58%) (Chart 3), which is quite higher as compared to other studies however it has been found that BPH and inflammatory changes has a predominant pathology as reported in various studies.¹⁴⁻¹⁶

Malignant lesions encountered in predominant age group includes two age groups affected equally 61-70 and 71-80, having 6 cases each (5.58%) with most common malignancy of adenocarcinoma of prostate (Chart 4),

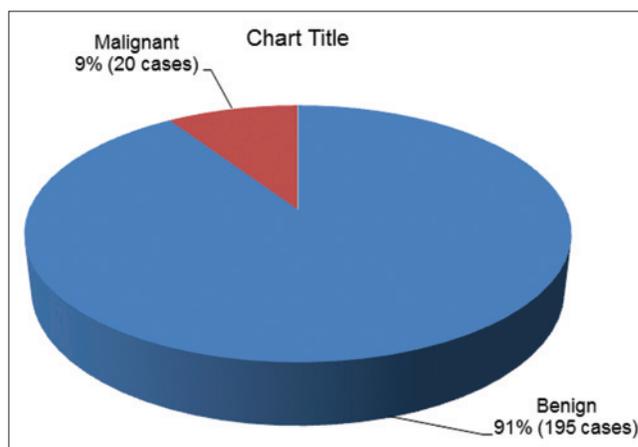


Chart 1: Distribution of benign and malignant lesions

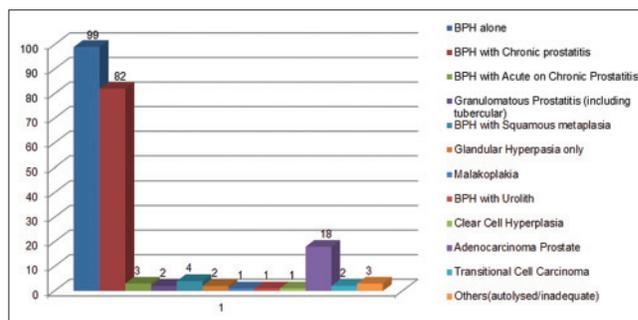


Chart 2: Distribution of histological sub-types

which is concordance with Indian and Western studies however the prevalence in present study was quite low.^{2,11} The low prevalence in the present study may be supported by the low average age of this tribal region, lack of health awareness and low volume of cases included in the study. Adenocarcinoma of the prostate contributes 90% of all malignant lesions in countered in this study followed by transitional cell carcinoma which was 10% which co-insides with other studies (Chart 5).¹⁴ Other lesions like granulomatous (tubercular) and pure glandular hyperplasia have contributed as rare findings.

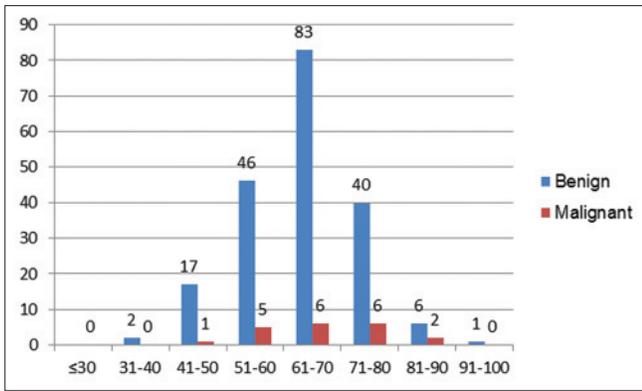


Chart 3: Age-wise distribution of cases

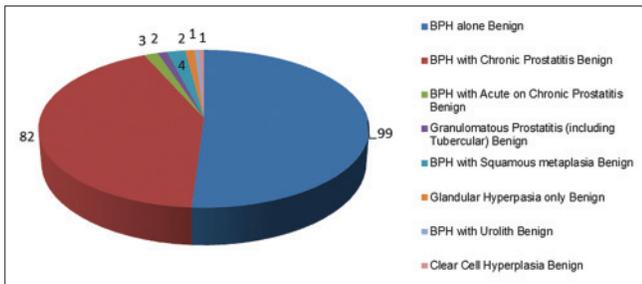


Chart 4: Distribution of benign cases

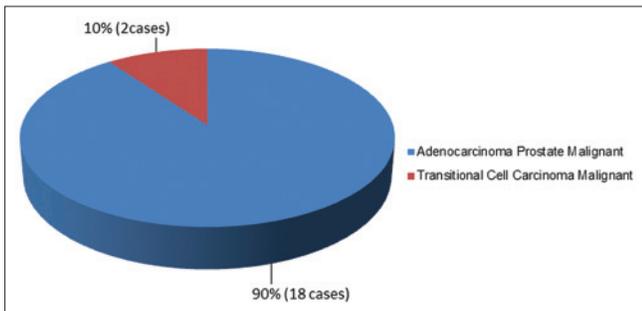


Chart 5: Distribution of malignant cases

CONCLUSION

According to this study prostatic lesions are common in age group of 51-80 years. Neoplastic lesions are more common than non-neoplastic lesions. Among the histological types of prostatic lesions, BPH is predominant type, followed by BPH with prostatitis. The aim of this retrospective

analysis was to study the prevalence of prostatic lesions at a tertiary care hospital in a tribal zone of central India. We have concluded this study in order to gain insight about the overall pattern of prostatic lesions in our settings.

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Ergonomics in Dentistry: An Ounce of Prevention is Better than Pounds of Cure: A Review

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Abstract

Ergonomics is an applied science concerned with designing products and procedures for maximum efficiency and safety. It is a scientific discipline that studies workers and their relationship to their occupational environment. Dentists and dental hygienists are at more risk for developing work-related musculoskeletal disorders (MSDs) as compared to general public because of their prolonged working hours and difficult postures. The most frequent injuries occur in spine, back, shoulders, elbows, and hands leading to many complex conditions such as Carpel tunnel syndrome, and sciatica. This paper is a review study of various studies and articles from around the world and identifies the potential risks and hazards of MSDs and discuss various methods to minimize such risks.

Key words: Dentist, Ergonomics, Musculoskeletal disorders, Occupational hazard

INTRODUCTION

Just over one in four of today's 20-year-old will become disabled before they retire.¹ While it is easy to imagine a carpenter falling off a roof or a farmer getting caught in a combine. The reality is many work-related injuries occur when the worker is simply sitting in an office chair or a dental stool.

In Greek, "Ergo" means work, and "Nomos" means natural law or systems. Ergonomics, therefore, is an applied science concerned with designing products and procedures for maximum efficiency and safety.²

Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and lead to long-term disability. Ergonomics is concerned with the efficiency of persons in their working environment. It

takes account of the worker's capabilities and limitations to ensure that task, equipment's, information, and the environment suit each worker.³

Musculoskeletal disorder (MSD) can affect the body's muscle, joints, tendons, ligaments, and nerves. They are caused by work itself or by working environment. It has been noted that back pain is most common followed by neck pain and shoulder pain.⁴ If early signs and symptoms are noted, with the understanding of mechanisms of progression of disease, MSDs can be prevented at a much larger scale.

Aims and Objectives

This review aims at:

- To identify potential risk of MSDs in dental office amongst all concerned personnel
- To discuss various preventive methods and remedies for problems arising due to poor ergonomics.

MSDs

Symptoms of MSDs⁵:

1. Excess fatigue in the shoulder and neck
2. Tingling, burning sensation in arms
3. Weak grip

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4. Numbness in fingers and hands
5. Clumsiness and dropping of objects
6. Hypersensitivity in hands and fingers.

Signs of MSDs⁵:

1. Decreased range of motion
2. Loss of normal sensations
3. Decreased grip strength
4. Loss of normal movement
5. Loss of coordination.

Risk factors leading to MSDs⁵:

- Repetitions
- Forceful exertions
- Awkward postures
- Contact stress
- Vibration
- Genetics
- Poor lighting.

Mechanisms involved in MSDs:

- Prolonged static postures
- Muscle ischemia/Necrosis⁶
- Hypomobile joints
- Spinal disc herniation and degeneration⁶
- Neck and shoulder injury
- Carpal tunnel syndrome⁷
- Lower back pain.

According to a survey done by Sharma *et al* amongst the Indian Dentists revealed that 23% Dentists do not seek treatment after diagnosis of MSDs and up to 5% dentists do not seek medical advice on appearance of symptoms of MSDs.⁸

PREVENTION

MSD can be prevented to a very large extent if care and precautions are taken during work.

Seating: Continued seating results in inactivation of upper and lower erector spinae muscle and contributes to greater lower back compressive loading in lumbar spine.⁹ Dental stool must be at correct height, offer optimum arm, and elbow support, be stable with five casters and stable base and offer neutral back, neck shoulder support.

Saddle style stools (Figure 1)¹⁰ helps avoid transfer of pressure to the posterior thighs and maintains the lumbar curve of the lower back by placing pelvis in a more neutral position.

Arm support during procedures (Figure 2)¹⁰ helps in giving rest to wrists and arms during procedure and prevents carpal tunnel syndrome.⁷

Magnification and procedure scopes: These devices can help the clinician prevent from gradually tilting his or her hand and leaning forward toward the patient (Figure 3).^{11,14}

Microscopes: Using a microscope lets the clinician focus the eyes specifically on operating field. There is no need



Figure 1: Saddle style stool



Figure 2: Stool with arm rests

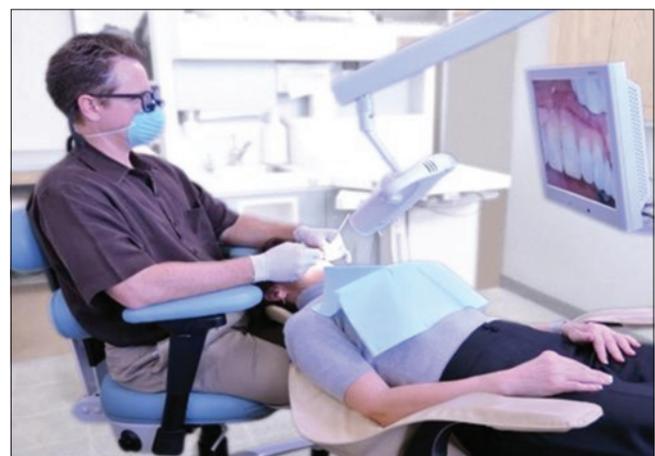


Figure 3: Magnification scope

to flex the neck, upper spine, and lower back to improve visibility (Figure 4).¹²

Dental loupes: Most frequent used. They offer $\times 2-5$ magnification. They do not allow more than 25° forward tilting of the head.¹⁰ Loupes are of two types – flip Up loupes (Figure 5),¹³ they can be flipped during procedure but are bulky and need to be realigned frequently.

The other variety is fixed loupes (Figure 6), they are lighter and give a wider field vision.

Selection of instruments: The instrument must reduce exertion of force and maintain hand and wrist in neutral position. Ergonomic guidelines for instrumentation are:¹¹

For hand instruments:

- Hollow or resin handles
- Round, knuckled, or compressible handles
- Carbon steel construction.



Figure 4: Microscope



Figure 5: Flip up loupes

For automatic handpieces:

- Lightweight
- Sufficient power
- Built in light source
- Swivel mechanisms
- Easy activation
- Easy maintenance.

For syringes and dispensers

- Adequate lumen size
- Ease in cleaning
- Knurled handles
- Easy activation and placement.

Rheostat positioning: The rheostat must be placed close to the operator or that the knee is at about $90-100^\circ$ angle. If placed outside this zone, the operator must shift weight to one side leading to asymmetric stresses on the back.¹¹

Exercises: The importance of exercises cannot be overstated in the prevention of MSDs. The workout should not require any special equipment, should not be technically difficult to master and should be of short duration. Three most common used exercises are:¹¹

- The Un-Twister (Figure 7)¹¹
 Legs in tripod position
 ↓
 Rest left elbow on left knee
 ↓
 Stretch arm overhead toward ceiling
 ↓
 Hold for 2-3 breath cycles, repeat
- Trunk Rotation (Figure 8)¹¹
 Sit tall, cross right leg over left leg
 ↓
 Place left forearm on right thigh and turn trunk to right
 ↓
 Hold and repeat
- The Reversal (Figure 9)¹¹
 Support wrists on hips and slowly lean backward
 ↓
 Do not overextend the head
 ↓
 Hold and repeat

Weight control: For additional 10 pounds of weight we carry, 100 pound of force is generated to lower back.



Figure 6: Fixed loupes

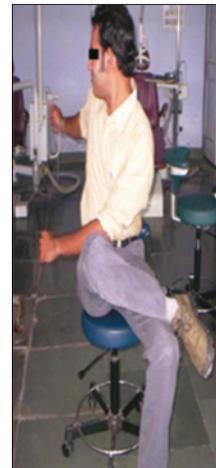


Figure 8: Trunk rotation

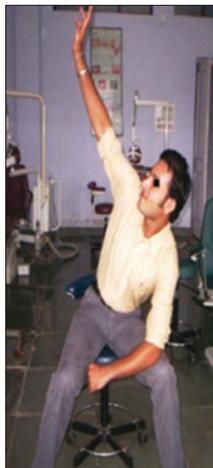


Figure 7: The untwister



Figure 9: The reversal

Dentist micro breaks: The operator can take a break to do stretching while the assistant light cures or mixes cements, etc.

DISCUSSION

Dental professionals are amongst the most targeted group for MSD because of their long procedural working hours and awkward postures. Development of disorders ranging from a simple sprain to carpal tunnel syndrome can be seen amongst clinicians.¹⁵ More awareness about good ergonomics is necessary for better health of dentists. A study was done by Kanteshwari *et al.* showed only 50% of the respondents were aware about ergonomics¹⁶ and 59.6% in another study done by Gopinadh *et al.*¹⁷ These statistics clearly demonstrate the need for awareness regarding ergonomics.

Many other factors like a constant vibration in the handpiece, lighting of workplace, shape of stool, micro

breaks, etc. affect the efficiency of the Dentist. Åkesson *et al.* in their study¹⁸ noted that practice of four-handed dentistry proved to be significant in reducing stress which was supported by Finkbeiner.^{19,20} In a study done by Lund, he appreciated the need for optimum temperature and lighting of the workplace for better ergonomics.²¹

The successful application of ergonomics assures high productivity and avoidance of illnesses and injuries. Unsuccessful application on the other hand can lead to work-related MSD. It is critical to seek prompt medical care for symptoms of ergonomic stress/detect risk factors.

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Occupational Stress in Anesthesiologists and Coping Strategies: A Review

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Abstract

Anesthesia is perceived to be a stressful specialty with growing production pressure on clinicians. Occupational stress due to conflicts between the demands of home and work, demand supply gap, fear of conception, job security, and litigation in anesthesiologists leads to burnout characterized by emotional exhaustion, depersonalization, and a sense of low professional accomplishments. This leads to problems like alcoholism, substance abuse, marital and interpersonal problems, emotional disorders, decreased empathy, and psychological withdrawal from work. Positive coping strategies include recognition, support of family and colleagues, organized work environment in the form of professional assistance and proper equipment, use of communication skills and efficient time management. Providing medicolegal protection, continuing medical education, workshops, monitoring physical and mental health of anesthesiologists is advocated to reduce the stress sources.

Key words: Anesthesia, Depersonalization, Mental health, Time management

INTRODUCTION

Occupational stress is defined as harmful and emotional responses that occur when the requirements of a job do not match the capabilities, resources or needs of the worker and can lead to poor health and injury.¹ Of course, a certain amount of stress is necessary in order to function well in any demanding job; it is when the stress becomes excessive that problems may arise. Stress and practice of anesthesia are no strangers and much discussion about its recognition and prevention has taken place in recent years. The scope of work of anesthesiologist has now expanded to include areas such as an emergency and intensive care, and management of acute and chronic pain. In addition, in teaching hospitals they have added responsibility of research, teaching, and administration. So, demand-supply gap of anesthesiologist has greatly increased, and they are overworked.

BURN OUT SYNDROME: CAUSES AND EFFECTS

Burnout, described as emotional exhaustion, depersonalization, and lack of personal accomplishment in response to chronic occupational stress occurs in anesthesiologists and is associated with adverse patient outcomes and increase in medical errors. The acuity and intensity of challenges in work environments such as anesthesiology which is stressful at baseline leads to increase in burnout.

Predominant age group for burnout syndrome has been reported to be 30-50 years. This may suggest that professionals with lower risk for burnout are those who due to their professional maturity have greater control of their emotions in stressful situations.²⁻⁴

A study⁵ was conducted where a questionnaire was used to study the Burnout syndrome. It included Maslach Burnout inventory. It highlighted low job satisfaction in 47.7%, and depersonalization in 48.5%. The burnout syndrome prevalence was 10.4% and occurred mainly amongst men (64.2%) aged 30-50 years (64.2%) with children (57.1%) and the following other features: Title of specialist (42.8%) over 10 years in profession (64.2%), work in night shifts

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(71.4%), sedentary (57.1%) and not attending courses or activities unrelated to medicine (78.5%). There was no difference between married and unmarried.

The syndrome has a higher prevalence in professionals who do not exercise management positions which suggests that authority, support from colleagues and job satisfaction may be protective factors. Higher prevalence of syndrome in professionals with exclusively public employment indicates public service lack of working conditions as a potential risk factor. Kain *et al.*⁶ reported that many anesthesiologists exhibit symptoms of chronic stress, sources of which included competence related factors, production pressures, long, and odd working hours, including night calls, fear of litigation, financial uncertainty, and interpersonal relationships.

Burnout syndrome may lead to problems like alcoholism, substance abuse, marital problems, emotional disorders, decreased empathy and psychological withdrawal from work.⁷⁻⁹ This leads to depression and other psychological illnesses and make them prone to drug addiction. The incidence of abuse is higher than general physicians and estimated to be around 1% in faculty members and 1.6% of residents.¹⁰ The commonly abused drugs include opioids (morphine, fentanyl, and sufentanil), propofol, ketamine, nitrous oxide, and volatile anesthetics.¹¹⁻¹⁴ Addiction to drugs impairs the health care professional and make them vulnerable. This can put the life of patients in danger and increases the professional liability for the anesthesiologist himself and his group in case of a lawsuit. It may be difficult to identify an impaired anesthesiologist as they tend to self-diagnose and treat themselves. The warning signs include absenteeism from work, changes in eating and sleeping pattern, mood swings in the form of conflict with colleagues and reporting late for duty.¹⁵

Lindfors *et al.*¹⁶ found that one in four Finnish anesthesiologists seriously thought of committing suicide some time or the other, with higher incidence in persons with poor health, low social support, and family problems. Professional burnout in the anesthesiologist and critical care professionals have been attributed to multiple causes. Sleep deficit leads to daytime sleepiness and impaired performance. Shift duties and irregular working hours due to complex and emergency cases leads to irregular sleep patterns.

Inadequate sleep reduces ability to perform sustained work and increases accidents. Sleep deprivation can also increase gastrointestinal and cardiovascular diseases, increases adverse pregnancy outcomes, increases risk of breast cancer, decreases immunity, impairs glucose metabolism, and leads to a decrease in cerebral metabolic

rate and psychological diseases.^{7,8,17} Fatigue causes decreased attention, prolonged reaction time, impaired memory, and decision-making^{8,17-19} thereby leading to errors and accidents. A stressed person gets fatigued easily than a relaxed person. Fatigued anesthesiologist is unable to maintain performance standards for long periods. A study reported an increase in incidence of unintentional dural puncture during epidural anesthesia at night (midnight to 6 am).²⁰

Aviation industry is continuously making efforts to decrease fatigue and stress among their pilots and thereby reducing the error. However, ironically the standards for anesthesiologists are far behind that of the aviation industry. An number of flying hours of airline pilots is fixed and regulated by federation aviation administration. Anesthesiologists in the interest of patients have to provide their services for extended hours. Pre-operative/preflight stress of a pilot is similar, but pilot will not fly the plane unless ground or maintenance staff gives 100% fitness to the plane but anesthesiologists has to depend upon physicians for pre-operative preparations (with no responsibility) and patient has to be invariably taken up with calculated risk. Take off, flight time, landing, and taxing of plane have been compared with induction, maintenance, reversal, and post-operative period, respectively each phase requiring multitasking, full alertness, concentration putting lot of stress on anesthesiologists mind.¹⁵ The accomplishments of anesthesiologists have not necessarily resulted in the improved recognition of their role in health care system. Previous studies have shown that recognition of anesthesiologists as a medical doctor by the patients varies from 65% to 82%.²¹⁻²³ Lack of recognition by patients plays a major role in bringing about dissatisfaction. Seniority makes minimal difference unlike other specialties as they always play their role behind the curtain. Only 28% anesthesiologists give talks to lay public about anesthesia, 9% of them do not even explain their role to patients on pre-operative visits. Taking the time to establish rapport with patient and patient's family before and after anesthesia makes anesthesiologist more visible and more recognized and appreciated.²⁴

Hawton *et al.*²⁵ noted that there was a higher rate of suicide in female doctors than males and that anesthesiologists along with psychiatrists, general practitioners and community health doctors had higher suicide rate than other hospital specialties. Anesthesiologists working in teaching hospitals have better working conditions, more operating room assistance, and the better academic environment resulting in better job satisfaction as compared to those working in community hospitals.^{26,27}

The Australian anesthetic incident monitoring study has shown that quality of anesthetic assistance is associated

with both the development and resolution of critical incidents.²⁸ From 5837 reports, adequate assistance contributed in 187 cases while skilled assistance in 808 cases minimized the incidents.

A good relationship with the surgeon is of fundamental importance in anesthesiology.²⁹ Poor interpersonal relationship may lead of considerable stress. Jenkins and Wong²⁶ found that senior Canadian respondents got higher regards from surgeons in comparison to the younger respondents. In a study on Californian anesthesiologists³⁰ 96% often had great working relationships with surgeons, but slightly over half did not believe that surgeons understand the risk of anesthesia. Surgeons pressurize the anesthesiologists to proceed with cases instead of postponing in spite of high risk and to hasten anesthetic procedures. This conflict of interest is a cause of stress. Conflicting demands is regarded as a risk factor for overwork.³¹ One of the factors causing dissatisfaction is lack of resources for purchasing required equipment and drugs. In 1967, the results of survey of morbidity among Russian anesthesiologists were published.³² There was no control group but rates for several conditions including liver disorder, headaches, insomnia, and spontaneous abortions among females were thought to be high; it was observed that, besides exposure to anesthetic gases, anesthesiologists also had long and irregular hours of stressful work and were exposed to extremes of temperature.

There are many pre-operative complications that may occur due to some unavoidable circumstances which may be beyond the control of anesthesiologists' skill and knowledge; and when they occur in an American Society of Anesthesiologists (ASA) Grade I patient, medicolegal problems are almost inevitable. These worries are always at the back of mind of anesthesiologist while performing his/her routine tasks, making him/her anxiety prone, and adding significantly to stress. On occasions, surgeries last longer than expected, and an anesthesiologist's entire schedule gets upset. He/she has to curtail the family time, is compelled to miss social gatherings and functions on many occasions. Many patients are in ASA Grade III, IV, and V and are critical. A few surgeries such as cardiothoracic, pediatric, and neurosurgery continue for long duration and need greater attention all throughout. Patient having medical problems such as diabetes, hypertension, ischemic heart disease, and obstructive pulmonary diseases and their associated complications need eternal vigilance. Minor errors in judgment can be disastrous.¹¹ Limitation of time is one of the most common reasons due to constant pressure to meet schedule, perform procedures quickly and move between the hospitals. The factors that contribute to specific stress are proximity to suffering and death, physical and emotional needs of patients, and the

pressure to always get good results even under varying conditions and expectations, and relationship within working environment. Most important is the relationship and interaction with surgeons. This type of relationship may involve confusion about responsibilities of each individual because of poorly defined boundaries leading to disarrangements over way to achieve the goals and select elements priority wise.³³

Physical stress results from exhausting factors of surgical environment, including noise pollution, exposure to anesthetic gases, radiations, latex, infections, excessive cold/heat, use of uncomfortable chairs, and even the detrimental in the limited space. Distractions in the form of external staff entering, exiting or initiating case-irrelevant conversation or case irrelevant discussions within the operating room team, acoustic distractions like telephones, radio, etc., faculty/equipment or teaching, work environment is known to cause stress in Surgeons, anesthesiologists and operating room team.³⁴ Although some distractions may be inevitable, others particularly during tasks that require undivided attention should be proactively limited as they can induce human error and have negative consequences on patient safety.³⁵ Noise pollution leads to sympathoadrenal activation which is detrimental in people with chronic anxiety/hypertension.⁴ Night shifts leads to sleepiness and fatigue generate lack of agility and attention, slowness of cognitive functions and reflexes, in addition to making the individual more impatient with everyday activities.

Continuing medical education (CMEs) and demands for performance indication pressurize all doctors. Keeping updated in current developments and insisting on minimum monitoring standards are of vital importance. Inability to have control and to organize work to ensure reaching desired goals produces frustration. In addition, anesthesia trainees face the heavy responsibility of service work with its large proportion of emergency work, coupled with increasing necessity to be successful in post-graduate examination at the first attempt.

Anesthesiologists often perceive themselves as powerless to change/control the situation.³⁶

Coping Strategies

The effective management of stress hinges on own's recognition and it affects all of us and it is not a sign of weakness. The management of stress hinges on the recognition of the nature and cause of stress and response of individuals. Stress management involves developing strategies which help to control stress. It is important to recognize the things which cannot be changed. Personal and family time is very important to combat stress. It is

important to develop hobbies which act as diversion and counteract the undesirable outcomes of stress.³⁶

Stressed doctors are reluctant to reveal their problems in case they prejudice their career prospects or job security. Communication skills and assertiveness are of paramount importance in dealing with stress as a discussion with friends, family and colleagues is really helpful. Interpersonal relationships, soft skills, communication skills and a high emotional quotient are required for the anesthesiologist to function smoothly as a team. Having a good network of professional associates helps in time of crisis for moral support and professional health.²⁴ Regular physical and relaxation exercises and meditation are helpful. Doctors are neither infallible nor superhuman. All are subject to stress and fatigue with varying abilities to respond reasonably to these without affecting themselves negatively. Time management and realizing that time cannot be expanded infinitely to meet demands is important. Anxiety in both social and work setting occurs if one is not able to speak up for what they feel is right. Learning to say “No” for a way that does not violate the rights of others and should be appropriate without being aggressive. People have irrational belief that doctors are capable of anything and everything which is demanded of them. To establish priorities and to be selective in tasks to be done while allocating appropriate time is to do things well but not obsessively is important. Doctors are often reluctant to accept that they need help and keep postponing things till it gets too late. A proper support system and “mentor system” at workplace is very important. More attention should be paid to improving working conditions, improving fee structure and coordinated efforts to improve public awareness about the challenges being faced by the anesthesiologists.³⁷

Realization of inner self potential, discipline at work place, a good sleep pattern, regular exercise and good nutrition are essential to combat stress.³⁸

Medicolegal protection by the hospital/directors and proper assistance in such matter to anesthesiologist will help combat stress. Better work organization help to combat stress, better time management, and job control, which reduces stress. Better working conditions in terms of ensuring availability of proper and latest anesthetic equipment's at all small/large hospitals, better remuneration for work done, good assistance, and limiting number of working hours, both elective and emergency could go a long way in reducing stress in anesthesiologists. Support of ASA and state component societies is crucial to meet the high need for education and professional resources. Strategies to lower stress also include “splitting” weekend call or having a second call available to allow rest periods or to help with complex patients, e.g., transplant, utilizing

pre-operative assessment clinics for day case and same-day admission patients and maintenance and learning new skills to ensure a high standard of practice, including legislature, business, and financial management courses, for which time and resources will be needed. Restructuring workload to allow time for research, vacation and group practice meetings improves the communicative and interpersonal skills. Regular morbidity and mortality reviews with other department's especially surgical colleagues improve communication and knowledge both.³⁹

In future, we should include appropriate stress management skills including counseling in the training of all junior anesthesiologists to prevent damaging and wasteful results of stress.⁴⁰

Sleep deprived anesthesiologists should never be pressurized to provide anesthesia. Various studies have shown that planned naps can improve subsequent alertness and performance. A National Aeronautics and Space Administration field study suggested a 40 min nap increased performance (34%) and physiologic alertness (54%) compared with the no nap condition. The maximum duty at a stretch should not be more than 12 h. One should have compulsory 1 week paid leave for a holiday every 6 months irrespective of the stage of career. Lounges with facilities for recreation (newspapers, treadmill) should be located in close vicinity to workplace so that doctors can de-stress themselves. Anesthesiologists should be compulsorily retired for 30 min every 4-5 h for de-stressing themselves. Stress management workshops should be conducted at regular intervals to help manage stressful times. There should be designated comfortable separate rooms for both genders adjacent to the operating room for night duty anesthesiologist for sleep and rest during postcall.¹⁵

CONCLUSION

Stress and professional burnout are a known entity in anesthesiologist due to imbalance between the demands being made and the ability to meet these demands. There is a need to set the protocol which would help reduce occupational stress and further improve efficiency and job satisfaction among anesthesiologists. Authorities like ASA may urge large scale multi center studies to lay down standards related to number of working hours per day and per week, number of night call duties per week, making proper assistance mandatory, preparing standard protocols, and guidelines for the anesthetic management of different clinical cases. Providing a periodic monitoring of these professionals', mental and physical health, medicolegal protection, workshops, and CMEs can help to achieve the target.

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Oral Candidiasis - Widely Prevalent, Frequently Missed

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Abstract

A Candidiasis describes a group of yeast-like fungal infections involving the skin and mucous membranes. Infection is caused by *Candida* species, typically, *Candida albicans*. The candidiasis is seen orally in people with altered oral ecology (from dental appliances, hyposalivation, or the use of immunosuppressants or antimicrobials) and/or impaired immunity (e.g., transplant recipients, persons on immunosuppressive treatments, persons with HIV/AIDS, or other cellular immune defects). With the high prevalence and opportunistic nature, it is one of the most common infections found in the oral cavity, especially in the geriatric population. Due to asymptomatic nature of the infection and clinicians negligence during the examination, it is one of the frequently missed pathology. The purpose of this study is to enumerate in detail the various types, epidemiology, and management of oral candidiasis.

Key words: Candidiasis, Cheilitis, Erythema, Immunology, Leukemia, Pemphigoid, Stomatitis, Squamous cell carcinoma

INTRODUCTION

The candidiasis is an opportunistic infection commonly affecting the oral cavity. It is often undiagnosed among elderly, particularly in denture wearers and in many cases is avoidable with proper oral hygiene care. It can also be a mark of systemic diseases, such as diabetes mellitus and is a common problem among the immunocompromised.¹ The candidiasis of the oral cavity is caused due to overgrowth or infection by a yeast-like fungi, *Candida*.^{2,3} The predominant ones are *Candida albicans* (the commonest), *Candida tropicalis*, *Candida glabrata*, *Candida guilliermondii*, *Candida pseudotropicalis*, *Candida krusei*, *Candida lusitanae*, *Candida parapsilosis*, and *Candida stellatoidea*.

C. albicans, *C. glabrata*, and *C. tropicalis* represent more than 80% of isolates from clinical infection.⁴ The oral candidiasis is the most common human fungal infection especially in

early and later life.^{5,6} In the general population, carriage rates have been found to range from 20% to 75% without any symptoms.⁵ The incidence of candidiasis in the oral cavity with predominant *C. albicans* isolation has been reported to be 45% in neonates,⁷ 45-65% in childrens,⁸ 30-45% of healthy adults,⁹ 50-65% in cases of long-term denture wearers,¹⁰ 65-88% in those residing in acute and long-term facilities,¹¹⁻¹³ 90% in patients with acute leukemia undergoing chemotherapy,¹⁴ and 95% of patients with HIV infection.¹⁵ *C. albicans* is a normal commensal of the oral cavity and is usually asymptomatic in healthy individuals. However, extensive overgrowth of the fungi can sometimes lead to symptoms such as altered taste sensation, local discomfort, and occasionally dysphagia.

Systemic candidiasis carries a mortality rate of 71-79%.¹⁶ It is important for all the clinicians treating the older patients to be aware of the risk factors, diagnosis, and treatment of oral candidiasis. In a recent study, it was found that 30% of clinicians agreed that, even without examining the oral cavity, they would prescribe nystatin for oral candidiasis on the request of assistant staff.¹⁷ Such negligence can lead to an inaccurate diagnosis, missed pathologies, and failure to address the risk factors which may lead to recurrence of candidiasis.

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CLASSIFICATION AND TYPES

There are different types of oropharyngeal candidiasis including acute pseudomembranous, acute atrophic, chronic hyperplastic, denture stomatitis, median rhomboid glossitis, and angular cheilitis.¹⁸

Acute Pseudomembranous Candidiasis (Thrush)

They commonly occur as adherent white plaques resembling curdled milk or cottage cheese on the surface of the labial and buccal mucosae, hard and soft palates, tongue, periodontal tissues, and oropharynx. The membrane can be scrapped off with a swab to expose the underlying erythematous mucosa (Figure 1). It is often easily diagnosed and is one of the commonest forms of oropharyngeal candidiasis accounting for almost a third.¹⁹ The diagnosis can be confirmed microbiologically either by culturing a swab from an oral rinse or by staining a smear from the affected area. Histologically, it is characterized by extensive white pseudomembranes consisting of desquamated epithelial cells, fibrin, and fungal hyphae. Predisposing factors include debilitating diseases such as diabetes mellitus, extremes of age, HIV infections, leukemias, those under steroid therapy, antibiotics or psychotropic drugs, and terminally ill patients.

Acute Atrophic Candidiasis

Acute atrophic candidiasis also known as erythematous candidiasis is commonly associated with burning sensations in the oral cavity or the tongue. Clinical appearance of white flecks may not be the prominent feature. The tongue may appear to be bright red or even give a bald appearance. The diagnosis may be sometimes difficult and should be considered in the differential diagnosis of a sore tongue, especially in a long-term denture wearing old patient who has received antibiotic therapy or who is on inhaled steroids. A swab from the affected area usually helps in confirming the diagnosis.

Chronic Hyperplastic Candidiasis

It characteristically occurs on the buccal mucosa or lateral border of the tongue as a speckled or homogenous white lesion (Figure 2). It is usually associated with smoking, and complete resolution of the infection seems to be dependent on cessation of the habit.²⁰ This condition can progress to severe dysplasia or malignancy and is also referred to as Candidal leukoplakia (Figure 3). *Candida* species may not always be isolated from the lesions of oral leukoplakia, and their presence in these premalignant lesions may be suggestive of a complicating factor rather than a causative one.²¹ This condition may be confused with lichen planus, pemphigus or pemphigoid, or squamous cell carcinoma.



Figure 1: Pseudomembranous candidiasis involving the dorsal surface of tongue



Figure 2: Hyperplastic candidiasis involving the right lateral border of tongue



Figure 3: Candidal leukoplakia involving the left commissural region

Denture Stomatitis

This condition is characterized by a localized chronic erythema of tissues in a denture wearing area. Lesions usually occur on the palate and upper jaw but may also

affect the mandibular tissues (Figure 4). It is quite a common lesion with a high incidence rate of up to 65%.

Median Rhomboid Glossitis

It occurs as a chronic symmetrical lesion on the tongue anterior to circumvallate papillae. It is made up of atrophic filiform papillae. The presence of *Candida* is detected in more than 85% of the cases in a biopsy of this area.²² It is often associated with smoking and the use of inhaled steroids.

Angular Cheilitis

It is an erythematous fissuring at one or both corners of the mouth, usually associated with an intraoral candidal infection. Other organisms implicated are staphylococci and streptococci. In case of staphylococci, the reservoir is commonly in the anterior region of the nostrils and spreads to the angle of mouth which has been confirmed by phage typing.^{23,24} Facial wrinkling at the corners of the mouth and along the nasolabial fold, especially in older persons, leads to a chronically moist environment that predisposes to this lesion.²⁵ This wrinkling is even worse in long-term denture wearers, as resorption of the alveolar ridges leads to a reduction in height of the lower face when the mouth is closed.²⁶ Other factors implicated in the etiology of this condition are iron deficiency anemia and vitamin B12 deficiency.

Chronic Mucocutaneous Candidiasis

It describes a group of rare syndromes, which sometimes include a definable immune defect, in which persistent mucocutaneous candidiasis response is extremely poor to topical anti-fungal treatment. Recent studies have shown defect in cytokine (interleukine 2 and interferon-g) production with reduced lymphocyte function (TH1 and TH2) activity in response to candidal and few bacterial antigens.

PATHOPHYSIOLOGY

C. albicans is the predominant causal organism of most types of candidiasis. It is a relatively harmless organism

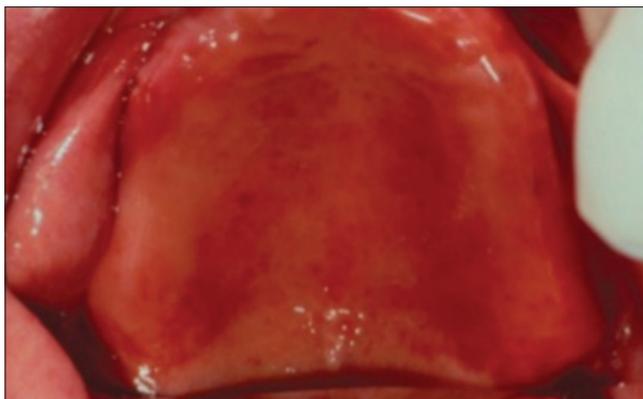


Figure 4: Denture stomatitis

inhabiting the oral cavity of almost 50% of the population. Other species including *C. krusei*, have been found in immunocompromised persons. *C. glabrata* is an emerging cause of oropharyngeal candidiasis in patients receiving radiation for head and neck cancer.²⁷ In patients with HIV infection, new species, such as *Candida dubliniensis* and *Candida inconspicua*, have been recognized.

EPIDEMIOLOGY

Frequency

The candidiasis is common in groups at risk, such as patients who are immunocompromised. Incidence of infection is rising, primarily because of HIV infection and both increase in candidal species and resistance to antifungals.²⁸

Sex

The candidiasis is reported to occur with equal frequency in both the sexes worldwide, except in areas where males with HIV infection outnumber females.

Age

The candidiasis predominantly occurs in the older-aged persons; however, it is primarily seen in the third and fourth decades of life in those with HIV infections.

Mortality

The candidiasis may occasionally predispose to esophageal spread that may prove to be life-threatening.²⁹

HISTOPATHOLOGY

Histologically, an increase thickness of the parakeratin layer with elongated rete ridges are seen. The candidal hyphae infiltrate the parakeratin layer and rarely penetrate into the cell layers of infected epithelium. Chronic inflammatory cell infiltrate in the connective tissue with neutrophilic microabscesses in the parakeratin layer is a prominent feature (Figure 5).³⁰

MANAGEMENT

Taking a history followed by a thorough examination of the oral cavity, including the hard and soft palates, the buccal mucosae are usually good starting points. In case of denture wearers, the examination should be done after they have been removed. Predisposing factors should be identified and resolved followed by an assessment of the type, severity, and chronicity of the infection.

The correct diagnosis can be reached based on the finding of characterized lesion, ruling out the other possibilities,

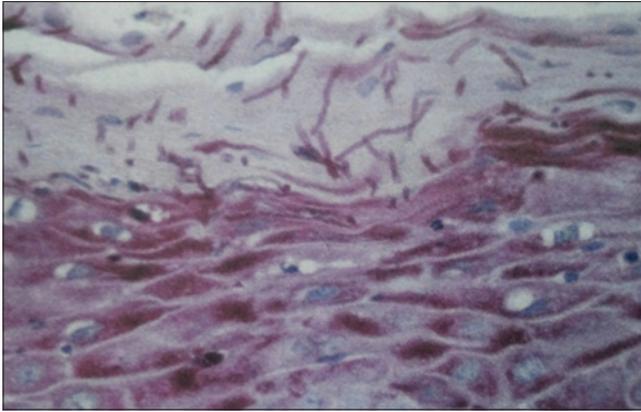


Figure 5: Histopathology showing tubular hyphae of *Candida albicans* embedded in the parakeratin layer (Periodic acid-Schiff stain)

and assessing the response to antifungal treatment. Acute pseudomembranous and chronic atrophic candidiasis can be treated based on the clinical features, however when the initial therapy is not successful, culture and sensitivity testing can be undertaken. Imprint cultures,⁶ have also been used for identification of *Candida* species, where sterile foams dipped in Sabouraud's broth are placed for 30 s on the lesion, and then for an hour in Sabouraud's agar containing chloramphenicol, after which they are incubated. Acute atrophic and chronic hyperplastic types may mimic other lesions and to rule out any kind of malignancy, a biopsy is recommended in addition to the empirical therapy. The oral hygiene maintenance and topical antifungals are usually adequate for uncomplicated forms of oral candidiasis.³¹

The oral hygiene involves scaling of teeth and regular cleaning dentures. Dentures should be cleaned and disinfected daily and left out overnight or at least 6 h daily. The dentures soaked in a denture cleaning solution such as chlorhexidine has been found to be very effective in eliminating *Candida* than brushing.³² This is because the porous and irregular surfaces of the dentures on which the *Candida* can easily adhere, cannot be removed by brushing alone. When rinsing the mouth with topical antifungal, the patient should ensure that the dentures are removed and that the entire oral mucosa is coated with antifungal and held in the mouth for a few minutes. The incorporation of an antifungal with a denture liner is recommended for patients with denture wearers. Furthermore, the mucosal surfaces should regularly be brushed using a soft brush. After disinfection, dentures should be allowed to air dry as this also kills adherent *Candida* on dentures.³³ Chlorhexidine can discolor both dentures and natural dentition if not removed adequately after disinfection. Other denture cleaning methods, like ultrasonic cleaning tanks using a suitable solution, are not routinely used but found to be effective.³⁴

Topical Antifungal Therapy

Use of topical antifungal therapy is the first line treatment for uncomplicated oral candidiasis. In cases where systemic treatment is essential, topical therapy should continue, as this reduces the dose and duration of systemic treatment required.³⁵⁻³⁷ The adverse effects and drug interactions are more likely to occur with systemic agents than with topical agents. In the early part of 20th century, gentian violet, an aniline dye was used for the treatment of candidiasis. However, because of its limitations such as staining of the oral mucosa and the developing resistance, polyene antibiotics such as nystatin (1951) and amphotericin B (1956) were introduced. They act by binding to the cell membrane sterols of the fungi, thereby altering the cell membrane permeability.^{38,39} Nystatin and amphotericin are not absorbed from the gastrointestinal tract. Whereas other drugs such as miconazole, clotrimazole, or ketoconazole, used for the topical application have side effects such as vomiting and diarrhea.

Nystatin is the most widely used topical agent for the treatment of oral candidiasis.^{2,3} It is available as an oral rinse, pastille, and suspension. The oral rinse contains sucrose and is found to be very useful in patients with HIV infections and also in completely edentulous patients. The clotrimazole troche can be an alternative to nystatin suspensions for those patients who find it unpalatable.

Systemic Antifungal Therapy

This therapy is appropriate in patients intolerant of or refractory to topical treatment and those at the high risk of developing systemic infections.⁴⁰

Both nystatin oral rinses and clotrimazole troches have high levels of sucrose content and in diabetic or immunocompromised patients or in the presence of decayed teeth, triazoles such as fluconazole or itraconazole have been found to be effective.⁴¹ The ketoconazole has also been found to be equally effective, but its use is not recommended in elderly patients, due to drug interactions and side effects which include hepatotoxicity.

The fluconazole is a potent and selective inhibitor of fungal enzymes which are involved in the synthesis of ergosterol. It disrupts cell wall formation followed by leakage of cellular contents and ultimately resulting in cell death. It is well absorbed by the gastrointestinal tract and does not produce side-effects such as hepatotoxicity. It is now listed in the dental practitioners' formulary as well as the British National Formulary and is widely used both the practices.

Itraconazole has a wider spectrum of activity than fluconazole, and is, therefore, valuable, in the treatment of candidiasis in immunocompromised patients who are resistant to fluconazole. Resistance to antifungals has

become increasingly common since the introduction of fluconazole especially in patients with advanced HIV disease and recurrent and long-term treatment.^{42,43}

Topical antifungal steroid creams and ointments are recommended for the treatment of angular cheilitis. Any concurrent intraoral lesions should also be treated at the same time, dietary deficiencies should be excluded and treated if found. Failure to respond to therapy especially in chronic atrophic candidiasis is usually due to non-compliance with the treatment.

In patients undergoing treatment for cancers, oral prophylaxis with antifungal agents reduces the incidence of oral candidiasis, and in such cases, fluconazole have been found to be more effective than topical polyenes. Similar therapy has also been found to be effective in patients with HIV infections.

PROGNOSIS

The prognosis for oral candidiasis is good with appropriate and effective treatment. Relapse, when it occurs is more often due to, inability to resolve the underlying or predisposing cause of infection, poor compliance with the therapy and failure to remove and clean dentures appropriately, in case of denture wearers.

DISCUSSION

Infection with the yeast-like fungal organism *C. albicans* is termed as candidiasis or candidosis. *C. albicans* is the primary organism causing the infection, although another member of the *Candida* genus, such as *C. tropicalis*, *C. krusei*, *C. parapsilosis*, and *C. guilliermondii*, may be also found intraorally, but very rarely cause the disease. *Candida* species are a routine component of the normal oral microflora. Factors such as systemic diseases, habits such as smoking, tobacco chewing, and long-term denture use, predispose to candidal infections. Clinically, candidiasis may present as white irregular flecks to severe erythematous patches. They commonly occur in older patients, but of late, their incidence is increasing in the third and fourth decades of life. The diagnosis is usually confirmed by taking a swab culture or biopsy of the affected area if required. Management of candidiasis includes identifying and removing the predisposing factors, use of antifungal therapy, good oral hygiene maintenance, and long-term follow-up.

CONCLUSION

The candidiasis is of various types affecting different regions in and around the oral cavity. They are usually

asymptomatic and rarely produce any problem to the patients, and hence, often missed during routine clinical examination. Obtaining a thorough history and identifying the underlying cause are the first step toward successful management. The treating practitioner should have a complete knowledge about the dosage, actions and side-effects of antifungal agents used for the treatment. Hence, it is important for all the clinicians, not to miss the candidal infection during routine examinations, and treat them appropriately.

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Retroperitoneal Dermoid Cyst: Case Report and Its Management

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Abstract

Retroperitoneal dermoid is a rare clinical entity. It usually presents as an abdominal mass as it was found in our case. At the time of presentation, it usually has large size ($D > 10$ cm). Here, we describe a 20 years male presenting to our hospital with swelling of the abdomen. After radiological and cytological examination, a provisional diagnosis of the dermoid cyst was done. On laparotomy, it was found to be retroperitoneal in location. Histopathology study was suggestive of benign cystic teratoma. Post-operative recovery was uneventful. After 6 months of follow-up patient is doing well, and there are no sign and symptoms of recurrence.

Key words: Abdominal Mass, Dermoid, Retroperitoneum, Teratoma

INTRODUCTION

Dermoid cyst in the retroperitoneum is a rare phenomenon occurs due to aberrant migration of germ cells from the yolk sac during fetal development.¹ It usually occurs in midline structures. Gonadal structures, e.g., ovary, testis are the most common site for teratoma localisation.² It comprises the tissues derived from all the three germ cell layers. It is lined by squamous epithelium showing fully formed or rudimentary dermal papillae, sebaceous glands, hair, and sweat follicles and it contains sebaceous materials. Most are benign, but any tissue type can undergo malignant transformation. Retroperitoneal cysts are asymptomatic in one-third of patients.^{3,4} Symptomatic patients have large size cyst at the time of presentation. Contrast-enhanced computed tomography (CECT) of the abdomen is used to confirm the diagnosis.^{2,5} Surgical excision of the whole cystic mass is the choice of treatment. After complete surgical resection the 5 years survival rate is nearly 100%. The presence of malignant

transformation tissue in the cyst needs more aggressive treatment.^{2,3}

CASE REPORT

A 20 years male presented with swelling in the lower abdomen since 3 months. He had no history of pain, fever, loss of appetite and weight, hematemesis, melena and normal bladder, and bowel habit. His general physical examination was normal. Abdominal examination revealed a palpable mass of size 15 cm × 10 cm occupying hypogastric, right and left iliac, right and left lumbar, lower part of the umbilical region. It was non-tender, firm, smooth surface, well-defined margin (lower margin could not reached), fixed, does not moves with respiration. On head and leg raised the swelling decreases in size. There was no other organomegaly, no shifting dullness, no other mass palpable, scrotum well developed, and bilateral testis normal in size and sensation intact. On digital rectal examination, no abnormality detected. Rest of the systemic physical examinations was unremarkable. Ultrasonogram shows a large solid mass of 140 cm × 125 cm × 80 cm size having irregular and ill-defined margin seen in the mid-lower abdomen possibly retroperitoneal with displacement of bowel loops and causing obstruction in both ureter, right > left. Cystic areas and multiple septa were seen in the posterior part of the mass. The solid area shows

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posterior echo diminution. CECT of the whole abdomen showed a large mixed density mass of size 143 mm × 131 mm × 105 mm seen in the right side of the pelvic cavity and right iliac fossa, extends up to the bifurcation of aorta level (Figures 1 and 2). The lesions caused displacement and splicing of the rectum, displacement of small bowel loops and compression of both ureters causing bilateral hydronephrosis (right > left). It also causing abutment with splicing of right common iliac vessels suggestive of retroperitoneal location. It contains nodular and speculated, linear, and serpentine calcification with wall calcification and isointense solid parts and fat containing areas suggestive of dermoid tumor. On fine needle aspiration cytology of the mass about 1 ml of thick straw colored fluid aspirated which showed clusters of cells with round to oval nucleus and multivacuolated cytoplasm, few giant cells. This is suggestive of benign cystic tumor with sebaceous differentiation. Laboratory investigations were within normal limits.

Laparotomy was done with the mid-midline incision. The cyst was strongly adherent to small bowel at the upper level, sigmoid colon at left side, ascending colon at the right side and fixed to the posterior structures (Figures 3 and 4). So meticulously, we excised about 40% of the cyst wall from its adherents. Posterior cyst wall (around 60%) left behind (considering dense adhesion to retroperitoneal major vessels) and inner wall is cauterized (Figure 5). Hemostasis achieved and excised specimen send for histopathology study. Post-

operatively patient recovered uneventfully and discharged. A histopathological study was consistent with benign cystic teratoma as it lined by squamous epithelium, contains intraluminal hair, bone pieces, sebaceous gland, fat cells.

DISCUSSION

Dermoid cyst is a cystic teratoma that contains an array of developmentally mature and solid tissues. Whereas a teratoma is a true tumor composed of multiple tissues of kinds foreign to the part in which it arises. Retroperitoneum is a rare site for dermoid cyst. Other rare sites are mediastinum, sacrococcygeal, central nervous system. Primary retroperitoneal teratoma constitute about 1-11% of all primary retroperitoneal tumors.^{2,3} Where retroperitoneal tumors do not include tumors of organs and retroperitoneal metastasis. About 43-45% of retroperitoneal teratomas diagnosed within the 1st year of life and 10-20% after 30 years of age. Adult retroperitoneal dermoid cyst commonly affects females (15-40 years of age). There is 25% chance of malignancy,⁶ malignant degeneration is higher in adults than children (25.8%:6.8%). Endodermal sinus tumor most common occurs in children (median age 1.5 years, alpha-fetoprotein [AFP] +ve), whereas in adults squamous cell carcinoma. The sign

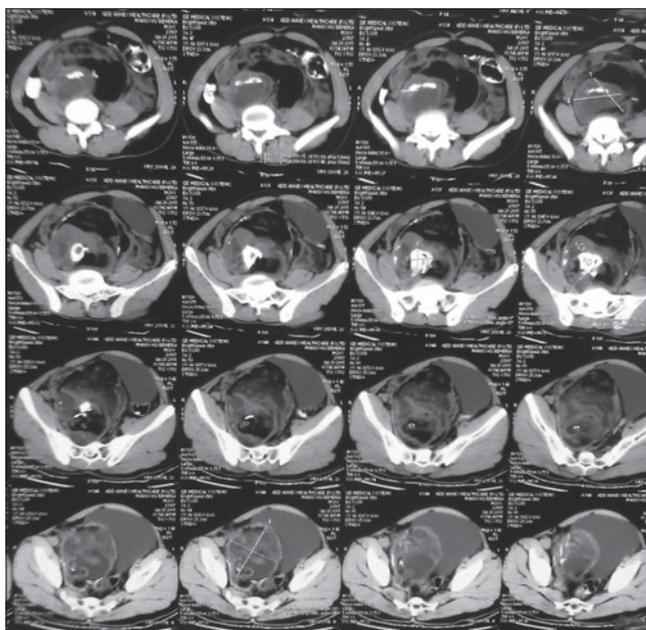


Figure 1: Axial images of contrast-enhanced computed tomography pelvis showing well-defined heterogeneous retroperitoneal mass lesion present in the right side anterior to the psoas muscle, pushing the bladder to the left anteriorly containing fatty tissues and calcifications

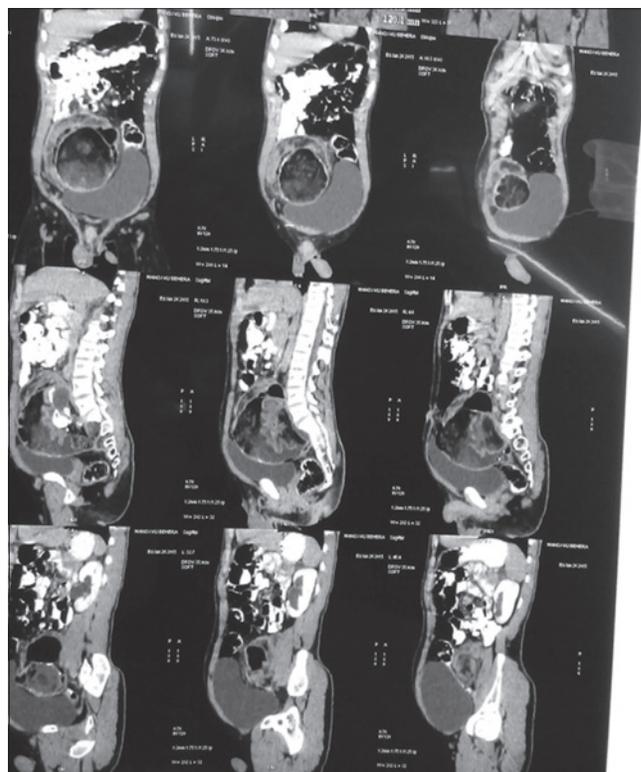


Figure 2: Coronal and sagittal images of contrast-enhanced computed tomography abdomen and pelvis showing heterogeneous well-defined lesion in the pelvis superior to urinary bladder

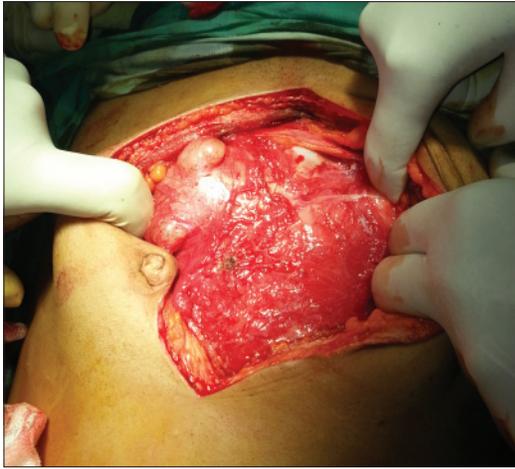


Figure 3: Cyst is adherent to the adjacent intra-abdominal hollow viscera



Figure 4: Removal of the contents of cyst e.g., hairs, fatty tissues, bone pieces

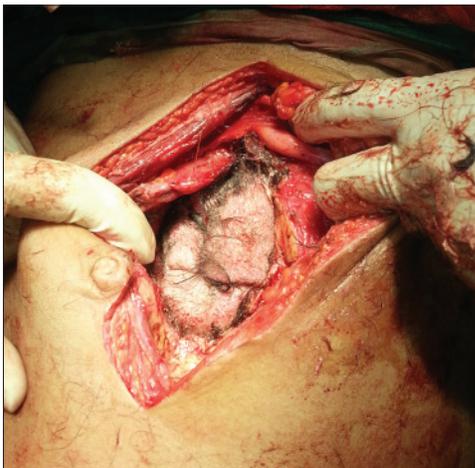


Figure 5: Posterior wall of the cyst, strongly adherent to the major vessels posteriorly

and symptoms of the retroperitoneal cyst are due to its compression to the adjacent structures, e.g., abdominal

pain, back pain, genitourinary symptoms, lower extremity, or genital edema.^{3,7} It can present as an unexplained abscess in the sacrococcygeal area, gonads, mediastinum or retroperitoneum.⁸ Differential diagnosis retroperitoneal cysts includes retroperitoneal sarcoma, hydatid cyst, ovarian tumor, mesenteric cyst, and renal tumors.⁴

CECT is the investigation of choice for diagnosis and to assess the extent of the cyst preoperatively.⁹ Magnetic resonance image is superior to ultrasonography and CECT, it predict respectability.^{5,10} About 50% of men with retroperitoneal tumors also have testicular carcinoma in situ, so testicular ultrasonogram is mandatory for them. Definitive diagnosis is made by histopathological examination.¹¹ Serum tumor markers (AFP, CEA, CA 19-9) level should be measured in suspicious patients of malignancy.⁷ They can be helpful in diagnosis, monitoring disease, and detecting relapse.

Whenever possible symptomatic cyst should be excised completely while adjacent vitals structure should be preserved. Complete resection of the tumor is curative. Marsupialization or draining of the cyst usually results in a recurrence, as we are expecting in our case. Spillage of cyst contents may lead to infection or recurrence. Between 1932 and 1987, 32 adults cases, male 17, female 15 were reported. In them left kidney upper pole was mostly affected.¹² Adjuvant radio and chemotherapy are given if malignant transformed retroperitoneal cyst detected histopathologically.

CONCLUSION

Though successful removal of dermoid cyst has been reported in difficult situations, open surgery is the most reliable and safe procedure for retroperitoneal dermoid. One should kept in mind that excision of the cyst as well as the preservation of the adjacent vital structures is also utmost important.

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Crocker & Hartzell's Disease of the Tongue: Two Case Reports with Review of Literature

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Abstract

Crocker and Hartzell's disease is an inflammatory hyperplasia of the skin and oral mucosa. This lesion is not associated with pus and histologically it resembles an angiomatous lesion rather than a granulomatous lesion. It is considered as a non-neoplastic tumor, and it presents itself in the oral cavity in various clinical and histological forms. The most common site of occurrence in the oral cavity is the gingiva. In this article, we are presenting two cases of Crocker and Hartzell's disease occurring on the tongue at two different locations. A 52-year-old female patient with a lesion on the dorsum of the tongue, and a 53-year-old male patient with the lesion on the lateral border of the tongue.

Key words: Disease, Gingiva, Non-neoplastic, Pyogenic granuloma, Tongue

INTRODUCTION

Crocker and Hartzell's disease is a synonym for pyogenic granuloma which is otherwise also known as "Capillary hemangioma"¹ or "granuloma pyogenicum"² due to the presence of numerous blood capillaries. It is an inflammatory hyperplasia of the skin and mucous membrane. First case of pyogenic granuloma was reported in 1844 by Hullihen and the term was coined by Hartzell in 1904.³ It occurs due to chronic low-grade trauma, physical trauma, hormonal factors, bacteria, viruses, certain drugs, calculus, and poor oral hygiene. The gingiva is the most common site of occurrence, accounting for 75% of all cases.⁴ It is a non-neoplastic tumor of the oral cavity and has got many clinical and histological forms. The term itself is considered as a misnomer as it is not associated with pus clinically and histologically it is an angiomatous lesion rather than a granulomatous lesion.⁵

In this article, we have presented two case reports of pyogenic granuloma occurring on the tongue. One case

of the 52-year-old female patient who came with an asymptomatic lobulated and pedunculated swelling on the dorsum of the tongue; and another case of the 53-year-old male patient who came with an asymptomatic non-lobulated sessile swelling on the lateral aspect of the tongue. The etiological factor was different in both the cases as the female patient had a poor oral hygiene and the male patient had sharp lingual cusps of the teeth that were lying in close approximation with the tongue.

We have also reviewed the literature and discussed the present cases with reference to the same.

CASE REPORT

The 52-year-old female patient came to the Department of Oral Medicine and Radiology with a chief complaint of a swelling on the dorsum of the tongue which she has been noticing for the past 6 months. She also gave a history of bleeding from the swelling while brushing and while having food. She also reported that the swelling was initially small in size which later increased to the present size.

On intraoral examination (Figure 1) there was the presence of an exophytic, pink, lobulated and pedunculated lesion measuring about 1 cm in diameter with a pseudomembranous surface with areas of erythema. The oral hygiene status was poor with a few missing teeth. The lesion was soft

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in consistency and non-tender with minimal bleeding. The provisional diagnosis was pyogenic granuloma with a differential diagnosis of irritational fibroma.

In another case, the 53-year-old male patient came to the Department with a chief complaint of a swelling in the right side of the tongue since the last 3 months. The patient experienced mild pain and bleeding while having food.

On intraoral examination (Figure 2) there was the presence of a sessile swelling of approximate size 1 cm × 0.5 cm on the right lateral border of the tongue almost 4-5 cm behind the tip of the tongue. The surface seemed to be mildly erythematous. On palpation, the lesion was firm in consistency and mild tenderness was present. Sharp lingual cusps in relation to 45, 46 were observed. In this case also we considered pyogenic granuloma as a provisional diagnosis.

Both the patients were diabetic and were being prepared for biopsy with written consent after routine blood

investigations and blood sugar examinations. Excisional biopsy was done under local anesthesia, and the specimens were sent to the department of oral pathology for histological examination.

The histopathological diagnosis was given as pyogenic granuloma in both the cases.

DISCUSSION

The exact etiology of this lesion is unknown though it was originally believed to be a botryomycosis infection.³ Regezi *et al.*,⁴ suggested that pyogenic granuloma can be caused by any stimulant or an injury such as calculus or foreign material and Ainamo² suggested that routine tooth brushing causes repeated trauma to the gingiva resulting in irritation and exuberant proliferation of these connective tissue lesions. Trauma to deciduous dentition, abnormal tooth development, occlusal interferences, and immunosuppressive drugs such as cyclosporine and improper placement of healing cap for implants are some of the other precipitating factors for pyogenic granulomas.² Kerr *et al.* has reported that staphylococci and botryomycosis cause localization of infection in blood vessel walls which contribute to the formation of the lesion.³

In our patients, the lesion may have occurred in the lady due to the poor oral hygiene and in the male due to the chronic trauma of a sharp cusp on the lateral border of the tongue.

Oral pyogenic granulomas occur in all age groups, from young to the old, but are the most frequent encountered in females in their the second decade due to the increased levels of circulating hormones estrogen and progesterone.² In our case both patients were in their the fifth decade of life. Hosseini *et al.*,² observed an increase in gingival enlargements during pregnancy and atrophied cases in menopause. Yuan *et al.*,² reported that the morphogenetic factors were higher in pyogenic granuloma rather than normal gingiva supporting the mechanism of angiogenesis in oral pyogenic granulomas in pregnant females. However, the effects of female hormones on oral pyogenic granulomas were questioned by Bhaskar and Jacoway⁵ since they found lesions both in males and females and concluded that there is no specific sex predilection. Even in our case both the sexes have been affected.

Bhaskar and Jacoway⁵ also demonstrated the presence of Gram-positive and Gram-negative bacilli in the ulcerated form of pyogenic granuloma suggesting that these organisms are contaminants from the oral cavity. This probably justified the inclusion of the term "pyogenic" in the term pyogenic granuloma which otherwise shows prominent capillary growth within a granulomatous mass

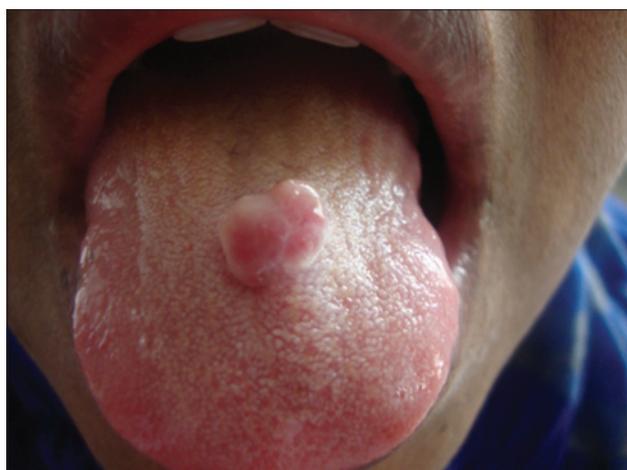


Figure 1: A lobulated and pedunculated swelling on the dorsum of the tongue of the 52-year-old female patient



Figure 2: A smooth surfaced sessile lesion on the lateral border of the tongue in the 53-year-old male patient

rather than the presence of pyogenic organisms and pus, so the term itself is a misnomer suggesting that it is not a granuloma in the real sense.⁴

The pyogenic granuloma of the oral cavity appears as an elevated, smooth or exophytic, sessile, or pedunculated growth covered with red hemorrhagic, and compressible erythematous papules, which appears lobulated and warty showing ulcerations and at times covered by yellow fibrinous membrane.⁴ There are two kinds of pyogenic granuloma namely lobular capillary hemangioma and non-lobular capillary hemangioma type, which can be differentiated by their histological features.¹ In case 1, the lesion was pedunculated and exophytic in nature. In case 2, the lesion was sessile and erythematous in nature.

The color varies from pink, red, or reddish purple depending on the vascularity of the growth.² Young pyogenic granulomas are highly vascular as they are composed predominantly of hyperplastic granulation tissue with capillaries.¹ Thus, even minor trauma may cause considerable bleeding in such lesions. Whereas older lesions become more collagenized and pink.⁷ In our case, both the lesions were erythematous due to trauma from the adjacent teeth.

The most common site of occurrence is the gingiva. Besides the gingiva it can also be noticed on the lips, tongue, or buccal mucosa, affecting the maxilla more than the mandible, the anterior region more than the posterior with the buccal surfaces being affected more than the lingual surfaces.⁸ In our case, both the lesions have occurred on the tongue stressing on the fact that it has occurred at two different sites.

The size of the lesion varies from a few millimeters to several centimeters in diameter. It is usually a slow asymptomatic growth,⁶ but at times may grow rapidly.² In our case, both lesions were approximately 1 cm in size.

Over the years various authors have suggested synonyms for the lesion such as granuloma gravidarum, pregnancy tumor, Crocker and Hartzell's disease, vascular epulis, benign vascular tumor, hemangiomatosis granuloma, epulis teleangiectaticum granulomatosa, and lobular capillary hemangioma.⁷ Kelley and Bernard regarded pyogenic granuloma as a "benign, acquired, vascular, and neoplasm."⁹

Although pyogenic granuloma is diagnosed clinically, radiographic and histopathological investigations aid in confirming the diagnosis and treatment. Radiographs are advised to rule out bony destructions suggestive of malignancy or to identify a foreign body.¹⁰

Histopathologically pyogenic granuloma is characterized by stratified squamous surface epithelium with underlying

connective tissue showing the proliferation of endothelial cells in a lobular pattern with numerous capillaries.⁸ In both our cases also similar histopathological findings were found (Figures 3 and 4).

The differential diagnosis for pyogenic granuloma included peripheral giant cell granuloma, peripheral ossifying fibroma, metastatic cancer,⁶ hemangioma, pregnancy tumor, conventional granulation tissue hyperplasia, Kaposi's sarcoma, bacillary angiomatosis, and non-Hodgkin's lymphoma.² The peripheral giant cell granuloma can be histologically identified due to the presence of multinucleated giant cells.⁶ Ossifying fibroma or peripheral odontogenic fibroma occurs exclusively on the gingiva; however, it has a minimal vascular component compared to pyogenic granuloma.^{1,4} Due to the proliferating blood vessels differential diagnosis of pyogenic granuloma from a hemangioma is made histologically in which hemangioma shows endothelial cell proliferation without acute inflammatory cell infiltrate,² which is a common finding in pyogenic granuloma. The

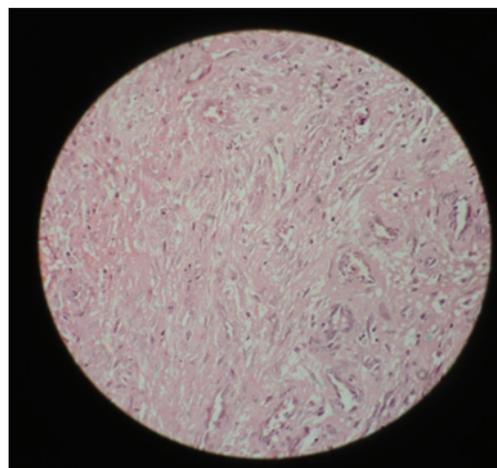


Figure 3: Histopathology picture of the 52-year-old female patient

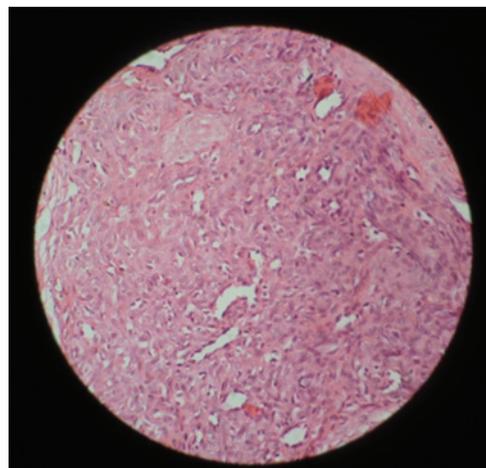


Figure 4: Histopathology picture of the 53-year-old male patient

diagnosis of pregnancy tumor is based on history and the influence of the female sex hormones.² Conventional hyperplastic gingival inflammation resembles pyogenic granuloma in histopathologic sections, and it is impossible for the pathologist to reach a diagnosis and in such cases.² The pyogenic granuloma is distinguished from Kaposi's sarcoma in acquired immunodeficiency syndrome due to the proliferation of dysplastic spindle cells, vascular clefts, extravasated erythrocytes, and intracellular hyaline bodies² none of which are seen in pyogenic granuloma.

The treatment for pyogenic granuloma includes excisional biopsy and for larger lesions incisional biopsy is recommended.⁴ Conservative surgical excision of the lesion with removal of irritant such as plaque, calculus, and foreign materials is recommended for small painless non-bleeding lesions.

Various other treatment modalities such as use of neodymium-doped yttrium aluminium garnet laser, carbon dioxide laser, flash lamp pulse dye laser, cryosurgery, electrodesiccation, and sodium tetradecyl sulfate sclerotherapy⁵ and use of intralesional steroids² have been used by various clinicians.

Even our two cases, an excisional biopsy was being done. When the patient was being reviewed after 1 week, the biopsy site had completely healed, and we continued the follow-up for 1 month and 6 months (Figure 5).

Taira *et al.*,⁴ have shown a recurrence rate of 16% of cases. Incomplete excision, failure to remove etiologic factors or repeated trauma contributes to recurrence of these lesions.¹ Vilmann *et al.*,² emphasized the need of follow-up for the cases.

CONCLUSION

Crocker and Hartzell's disease or pyogenic granuloma is a common lesion of the skin and oral cavity, especially the gingiva. The cases of pyogenic granuloma occurring in an extra gingival region such as on the tongue in a male and female patient in the fifth decade of life gives an insight into its myriad etiological factors, clinical features and appearances, histological presentations, treatment

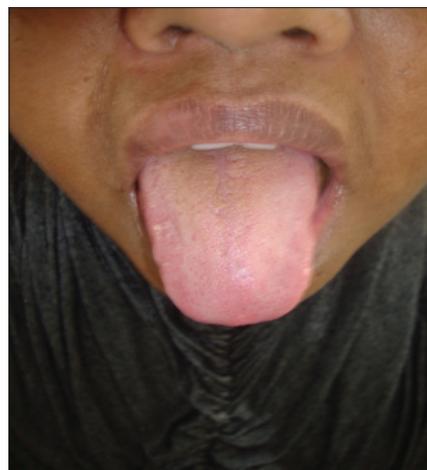


Figure 5: Complete recovery of the lesion after a follow-up of 1 month

modalities, and recurrence rates and describes how the diagnosis and treatment of such a case was completed and followed up for a period of 6 months. The article also highlights the fact that though the term pyogenic granuloma is frequently used it is not associated with pus, and histologically it resembles angiomatous lesion rather than granulomatous lesion indicating that the term "pyogenic granuloma" is a misnomer.

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Intralesional Sclerotherapy in Hemangiomas of the Glans Penis

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Abstract

Hemangiomas are vascular benign lesions which can occur on any part of the body. Urinary tract hemangiomas and specifically that of glans penis are extremely rare. Treatment modalities available for such lesions are surgical excision, cryotherapy, sclerotherapy, and electrofulguration. In view of the paucity of reported patients a gold standard for treatment is yet to be established. A 22-year-old male with hemangioma of glans penis of 10 years duration presented because of his concern about lesion rupturing during the act of coitus. The patient was successfully treated with sclerotherapy using 2 ml of 2% sodium tetradecyl sulfate. Lesion resolved completely 5 weeks post-sclerotherapy and there was no evidence of any recurrence in follow-up period of next 2 years.

Key words: Hemangiomas, Laser therapy, Penis, Sclerotherapy, Sodium tetradecyl sulfate

INTRODUCTION

Benign vascular malformation is called as “hemangiomas.” They are classified as capillary, cavernous, arteriovenous, venous, and mixed subtypes. Urinary tract hemangiomas constitutes 2% of all hemangiomas.¹ Only 1% of all hemangiomas comprises scrotal and penile hemangiomas which can extend into perineum, thigh or even anterior abdominal wall.² We present a case of young man with hemangioma on the glans penis which was treated with intralesional sclerotherapy.

CASE REPORT

The 22-year-old unmarried man came with complaints of gradually increasing painless swelling of insidious onset

over the glans penis since last 10 years. The patient had no urinary complaints or any difficulty in erection. Patient gave no significant family history.

On examination, there was an elevated irregular bluish red lesion of size 2 cm × 1.5 cm on the left dorsolateral portion of the glans penis (hemangioma of the glans penis) (Figures 1 and 2). The lesion was compressible, painless and non-pulsatile. There was no local rise in temperature. Lesion did not increase on erection of penis. Both the testicles were normal in size and shape.

Clinical examination was consistent with the diagnosis of hemangioma on the glans penis. Color Doppler studies of lesion on the glans penis showed well-defined, hypoechoic lesion of approximately 1.4 cm × 0.8 cm on dorsal aspect of the glans penis, in the subcutaneous plane. It showed few feeding vessels traversing it and showing column flow on Doppler imaging. Lesion was abutting the tunica albuginea. Corpora cavernosa was normal. There was no influx or efflux from the corpus spongiosum.

Treatment was performed under local anesthesia using 2% lidocaine for penile block. 2 ml of sclerosant sodium tetradecyl sulfate 2% was used. The first hemangioma

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Figure 1: Hemangioma of glans penis

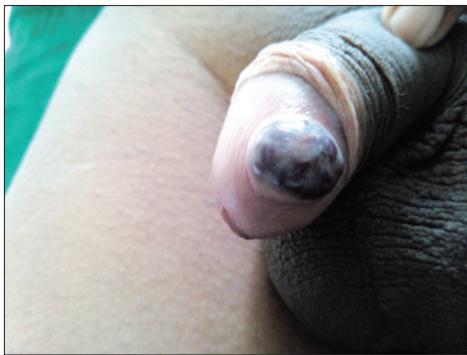


Figure 2: Hemangioma of glans penis

was emptied by compression. A tourniquet was applied at the base of the penis to prevent further refilling of hemangioma. We used 26-gauge needle for injecting 2 ml of 2% sodium tetradecyl sulfate into hemangioma directly. Compression of the hemangioma was maintained exactly for 5 min after which it was released. Post-sclerotherapy, compression dressing was applied over the lesion on retracted glans penis for 48 h.

Close observation was kept on the patient for development of preputial edema, urinary complaints or any bleeding through injected sites within first 48 h. After that daily cleaning of glans penis with normal saline and repositioning of prepuce was done twice a day, until first 2 weeks. The patient was followed up every 3rd day after the treatment. There was mild telangiectasia in the surrounding area and formation of scab over the lesion. In 7th week post sclerotherapy scab separated on its own leaving a flat area beneath it with minimum pigmentation.

Lesion resolved completely (post-sclerotherapy after 5 weeks) (Figures 3 and 4). The patient will be followed up quarterly over next 2 years for any recurrence.



Figure 3: Post-sclerotherapy after 5 weeks



Figure 4: Post-sclerotherapy after 5 weeks

DISCUSSION

Benign vascular malformations are called as hemangiomas. Urinary tract hemangiomas constitutes 2% of all hemangiomas.¹ Scrotal and penile hemangiomas comprises 1% of all hemangiomas which occasionally may extend into perineum, thigh or even anterior abdominal wall.² Approximately 80% of penile hemangiomas are located in the glans.³ Hemangiomas of urethra, genital skin and prostate have been also reported rarely.⁴

Reports of hemangioma of glans penis are scarce in the available literature.⁵ Hemangiomas of glans penis usually present within first two decades of life, and they usually enlarge with the increasing age.⁶ Such lesions may continue to grow although small, asymptomatic lesions may be left under observation.⁴ However in our case, this young patient was concerned about rupture of the lesion during act of coitus hence intervention in the form of sclerotherapy was performed.

The majority of lesions of hemangioma of glans penis do not require any treatment as they are asymptomatic. Treatment is only required in cases of the presence of symptoms such as pain, bleeding from lesion or for cosmetic purposes.

Due to less number of reported cases of glans penis hemangioma there is a lack of standard therapeutic protocol. Different types of available therapies for treatment of hemangioma of glans penis include cryotherapy, surgical excision, sclerotherapy, and electrofulguration.⁷

Jimenez-Cruz and Osca were the first to introduce neodymium:Yttrium-aluminum-garnet (Nd:YAG) laser in the treatment of hemangioma of glans penis. Nd:YAG laser has excellent tissue coagulation properties without causing any fibrosis, but its tissue penetration rate is deeper as it is poorly absorbed by body pigment.⁸ Potassium thiophosphate laser is preferable in children, mainly in large lesions as it is absorbed by hemoglobin and hence produces less scar. According to available literature laser treatment for such hemangiomas has shown good functional and cosmetic result.⁹ However, availability of laser therapy and cost-effectiveness is major issue.

Intralesional sclerotherapy is a cost-effective method which is easily available and is inexpensive. Prolonged compression over the injected site after injection of sclerosant is known to achieve better results with least morbidity.¹⁰ Compression causes direct contact of sclerosant agent with the endothelium which disrupts endothelium and causes edema in few minutes. This causes thrombus formation in lumen of vessel followed by subsequent fibrosis leading to endosclerosis.⁹

Amongst variety of sclerosants which are available such as 30% hypertonic saline, 2% or 3% sodium tetradecyl sulfate, ethanolamine, 2% hydroxypolyaethoxydodecanol, and polyiodide iodine, sodium tetradecyl sulfate 2%, 2 ml in quantity was used by us. We used

26-gauge needle for injecting sclerosant, but other gauge needles have also been used according to literature.³

CONCLUSION

Surgical excision has high risk of damaging underlying structures and causing deformity. Since hemangioma over glans grows beneath the epidermis so partial resection of corpus spongiosum is almost always necessary.³ Glans penis is devoid of subcutaneous tissue and tunica albuginea of corpus spongiosum is very poorly developed. This characteristic anatomy of glans penis makes it difficult to dissect skin from corpus spongiosum.

The rarity of hemangioma of glans penis and its poor documentation with respect to treatment makes it difficult to choose best method among available modalities. This case is presented for its rarity and satisfactory outcome of sclerotherapy.

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Leiomyoma of Nipple: A Rare Case Report and Review of Literature

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Abstract

Cutaneous leiomyomas are benign smooth muscle tumors and are rare. They usually occur in genitourinary and gastrointestinal tracts. According to review of the literature, only about 50 cases have been reported until date. They can be solitary and rarely multiple. They are reported predominantly in middle aged females, with an approximate sex ratio (female:male) of 3:1. Nipple leiomyomas tend to be smaller than 2 cm in diameter and must be clinically differentiated from angioliipomas, glomus tumors, eccrine spiradenomas, neurofibromas, nevi, lipomas, Paget's disease, and breast carcinoma. Histopathological examination and immunohistochemistry are necessary to establish the diagnosis and to differentiate it from benign and malignant lesions. Complete excision of the tumor with histologically confirmed tumor free margin is the recommended treatment as it has high risk of recurrence. Herein we report a case of leiomyoma of the nipple of right breast in a 40-year-old woman.

Key words: Benign neoplasm, Leiomyoma, Nipple, Rare

INTRODUCTION

Leiomyoma is a benign smooth muscle neoplasm. It commonly occurs in organs such as uterus, however, can also arise in esophagus and small bowel.¹ Virchow, the eminent 19th century German pathologist stated: "Die mamma ist die amme der geschulste lehre" which meant, "The breast is the wet nurse of the student of tumor, because so many different types of neoplasm develop within it."²

Benign lesions of the breast in total are much more frequent than malignant ones. However, there are no exact epidemiologic data on the prevalence of benign or malignant lesions of the nipple and the bibliography on benign nipple tumors which have been described in the literature includes leiomyoma, milium, florid papillomatosis, syringomatous adenoma, nevoid hyperkeratosis, fibroma,

pseudolymphoma, and haemangioma.³ Leiomyoma of the nipple and areola is one of the most uncommon non-epithelial tumours.¹ Because of its low morbidity most cases go unreported. According to previous literature, only about 50 cases have been reported till date.⁴ It can even occur in breast parenchyma and may mimic malignancy clinically.⁵ In one of the largest review in English literature in the year 1989, only 19 case of leiomyoma involving the nipple or areola were identified, of which four were in men.²

Cutaneous leiomyomas can be divided into five types: (1) Multiple piloleiomyomas, (2) solitary piloleiomyomas, (3) solitary genital leiomyoma, (4) solitary angioleiomyoma, and (5) leiomyomas with additional mesenchymal elements.⁶ They can also be classified into 3 categories according to the muscle fibers from which they originate, namely, piloleiomyomas: Originating from the smooth muscle fibers of the arrector pili muscle; angioleiomyoma, originating from the tunica media of the blood vessels; and dartoic or genital leiomyoma, originating from the smooth muscles of the scrotum, nipple, areola, or vulva. Genital leiomyomas are the least common type of leiomyoma and those located over nipple and areolas are still rarer.⁷ It arises from vascular, arrector pili, genital,

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and areola smooth muscles.⁵ There is a well-developed layer of smooth muscle in the corium of the areola from which the leiomyoma might arise. Contraction of these muscularis mamillae may be seen on stimulation of the nipple.² Nipple leiomyomas can be unilateral or bilateral.⁶ It usually occurs in middle aged females, but few reports of male nipple leiomyomas associated with gynecomastia have also been reported in the literature.⁸ The groin and nipple leiomyomas are usually solitary and are asymptomatic while the cutaneous leiomyomas are sometimes painful, either spontaneously or in response to cold, emotional or tactile stimuli. The pain is thought to occur due to calcium dependent contraction of smooth muscle cells within the tumor.⁶

Other symptoms of nipple tumors include, pruritis, serosanguinous discharge, lichenification, erosion, and nodular enlargement produced by either malignant or benign nipple tumors although neoplasm occurring in the skin and subcutis tissue over breast are benign, they may be misdiagnosed clinically as primary breast carcinoma.³ We report a case of leiomyoma of the nipple in a 40-year-old female. The gross and microscopic features along with various differential diagnoses are discussed.

CASE REPORT

A 40-year-old female patient came to our hospital with 6 months history of enlarging, painful, hard lesion of right nipple. There was no history of nipple discharge or nipple ulceration. No history of breast lumps or axillary lymphadenopathy. There was no history of trauma or intake of drugs. All routine investigations were within normal limits. The lesion was completely excised and was sent for histopathological examination. Following excision, there has not been any history of recurrences during a follow-up period of 4 months.

Gross Examination

The skin covered mass was well-circumscribed, measuring about 3 cm × 2 cm × 1 cm. The cut surface showed homogenous, whitish and whorled appearance (Figure 1a and b).

Microscopic Examination

Sections studied showed raised hyperkeratotic epidermis with minimal papillomatosis with increased basal layer pigmentation. The dermis showed the presence of a well-circumscribed, unencapsulated tumor composed of spindle cells with oval shaped nuclei and eosinophilic cytoplasm arranged in interlacing bundles and short fascicles (Figure 2). The glandular elements were absent. There was no cytological atypia, mitosis or necrosis. Immunostaining



Figure 1: (a) Gross picture of well-circumscribed skin covered mass, (b) Cut surface revealing homogenous whitish surface with whorled out appearance

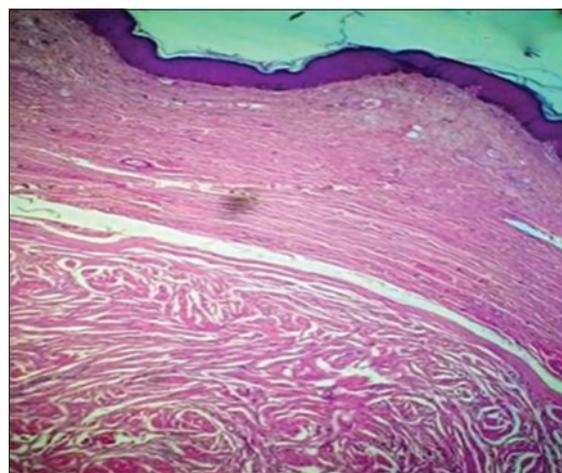


Figure 2: Microphotograph is showing a polypoid, nipple like lesion covered by epidermis with basal hyperpigmentation. The dermis shows a well-circumscribed mass composed of smooth muscle cells (H and E, x40)

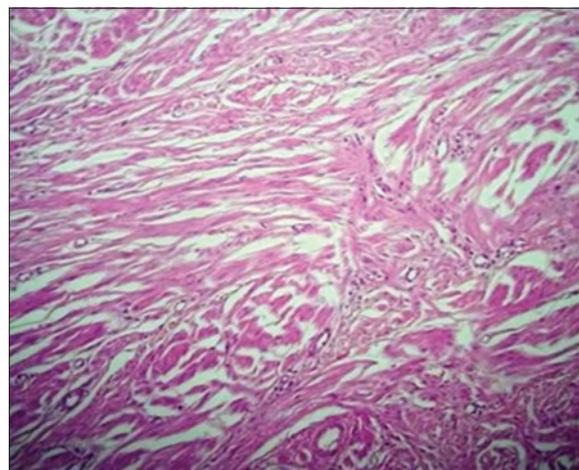


Figure 3: Microphotograph showing typical interlacing fascicles of spindle cells with abundant cytoplasm and oval nuclei with blunt ends (H and E, x100)

for smooth muscle actin was positive (Figure 3). In view of clinical, histopathological and immunohistochemistry findings, the lesion was designated as the nipple leiomyoma.

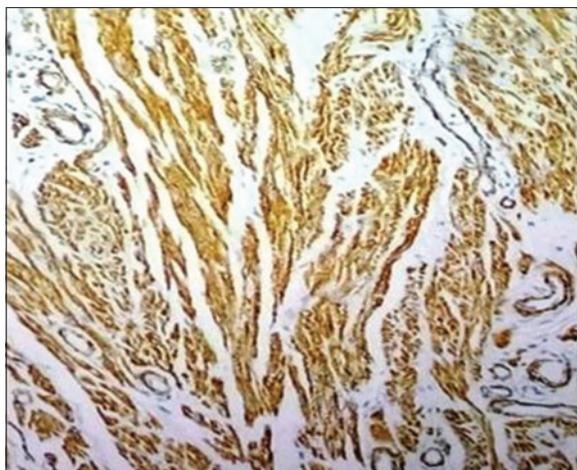


Figure 4: Microphotograph of immunohistochemistry marker (smooth muscle actin [SMA]) showing diffuse positivity (SMA, x100)

DISCUSSION

Leiomyoma of the nipple is a very rare benign neoplasm, which was first described by Virchow in 1854.⁴ These tumors are most common seen in middle aged women with an approximate sex ratio (female: male) of 3:1.⁶ In females, it has been speculated to be related to estrogen and progesterone.⁸ Other causes include trauma and certain drugs like oral contraceptives. Similar nipple leiomyomas are also seen in males, associated with gynecomastia, or idiopathic.³ Duration of these lesions ranges from 1-month to several years, and it usually involves the right breast, as in our case. No history of nipple discharge or retraction has been noted in all cases. It is usually single but occasionally can involve both breasts. Sometimes it can be a part of Reed's syndrome which is an autosomal dominant genetic condition, characterized by multiple cutaneous and uterine leiomyomatosis.⁶

The origin of leiomyoma in nipple and parenchyma has been proposed by Kaufman *et al.* in his theory that these neoplasm arise from smooth muscle cells that surround capillaries in the subcutaneous tissue of the breast. Diaz-Arias *et al.* suggested that the origin of these tumors may be from, (a) Teratoid origin with extensive overgrowth of the myomatous elements, (b) embryologically displaced smooth muscle from nipple, (c) angiomatous smooth muscle, (d) multipotent mesenchymal cells, and (e) myoepithelial cells.⁵

Hereditary multiple cutaneous leiomyomatosis is a tumor predisposition syndrome characterized by multiple cutaneous and uterine leiomyomas and increased risk of developing renal cancer up to 1-7%. Hence, abdominal imaging should be done in patients with family history and multiple leiomyomas. Our patient did not have uterine leiomyomas, family history of cutaneous leiomyomas or renal mass.

Nipple leiomyomas are usually <2 cm, and it should be clinically differentiated from angioliipomas, glomus tumor, eccrine spiradenomas, neurofibroma, nevi, lipomas, Paget's disease, and breast carcinoma. Histopathological examination is necessary to establish the diagnosis. Piloileiomyomas are smooth muscle tumors and are usually well differentiated. They occur mainly in the reticular dermis and are not encapsulated. The smooth muscle bundles are interlaced with varying amount of collagen. Special stains like von gieson can be used to distinguish smooth muscle from collagen. Immunohistochemical stains for desmin, S100, smooth muscle actin marker for smooth muscle differentiation may be performed to detect leiomyoma.⁶ The electron microscopy details are round to fusiform nuclei with frequent folds and notches. Moderately dispersed chromatin and surrounded by a compact nucleolus. The cytoplasm shows prominent parallel arrays of thin filaments with focal densities, numerous pinocytic vesicles, and focal aggregates of glycogen. Focal intercellular desmosome like structures can be seen.⁵

The various differential diagnosis include adenoleiomyoma, cystosarcoma phyllodes, fibroadenoma with prominent smooth muscle, fibromatosis, benign spindle cell tumor of the breast, fibrous histiocytoma, myoid hamartoma, myoepithelioma, and leiomyosarcoma. The first three lesions contain ductal elements, hence can be ruled out. Fibromatosis, benign spindle cell tumor, fibrous histiocytoma, and myoepithelioma are composed of fibroblasts, myofibroblasts, and myoepithelial cells than purely smooth muscle bundles. Myoid hamartoma is composed of scattered glandular elements between fibrous tissue and smooth muscle. Leiomyosarcoma is a malignant lesion that presents in the middle aged and elderly female patients. It is more cellular with pleomorphism, mitotic activity and sometimes coagulative type of necrosis.¹ Rarely leiomyomas show cytological atypia and mitosis.⁹ However, our case did not reveal increased cellularity, mitosis or cytological atypia.

Medical treatment includes calcium channel blocker and alpha adrenergic blockers to reduce the pain. Gabapentin an anticonvulsant drug has also been used to control piloileiomyomas related pain. The usual treatment is complete excision with tumor free margins as there is a very high chance of recurrences. Even carbon dioxide laser is also used as a treatment modality.^{6,7}

CONCLUSION

Leiomyoma of the nipple is rare benign smooth muscle tumors. Careful history taking and complete excision of the tumor with histologically tumor free margins is the recommended treatment as it has a high rate of local

recurrence up to 50%. Re-excision should be performed in the case of positive margin. Sometimes, cutaneous leiomyomas may be a sign of underlying systemic disorders. If multiple cutaneous leiomyomas are present, then detailed family history and abdominal imaging should be performed to rule out malignancy. Histopathological examination and immunohistochemistry stains help to distinguish leiomyoma from other benign and malignant breast lesions.

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An Unusual Cause of Cough: Hamman's Syndrome

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Abstract

Spontaneous pneumomediastinum or Hamman's syndrome is a rare entity without any predisposing factors. Besides its rarity, it is generally presented with non-specific respiratory symptoms (such as an only cough) and may be misdiagnosed or underdiagnosed. A 16-year-old female presented to the emergency department of our hospital with progressive non-productive cough over the last 2 weeks. She had been prescribed non-specific antibiotics with the diagnosis of upper respiratory tract infection and no improvement occurred in 10 days. Further clinical evaluation of the patient revealed a case of Hamman's syndrome. This syndrome should always be kept in mind especially in young patients presenting with non-specific respiratory symptoms, and if there is a doubt further evaluation should be performed.

Key words: Diagnosis, Pneumomediastinum, Spontaneous, Syndrome, Treatment

INTRODUCTION

Pneumomediastinum is the presence of air within the confines of mediastinal structures which originates from the alveolar space or conducting airways.¹ This entity was first described by Laennec in 1819.² However, first reported case of spontaneous pneumomediastinum belongs to Hamman and the disease was later named in his honor (Hamman's syndrome).³ Hamman's syndrome is a rare medical condition without any apparent predisposing factor or disease. It is triggered by coughing, vomiting, intense exertion, and Valsalva maneuver, all of which cause sudden increase in the intra alveolar pressure without trauma.⁴ It may be misdiagnosed because of its uncommon presentation and non-specific symptoms such as only cough, as seen in this case.

Hereby, we report a case of Hamman's syndrome misdiagnosed as upper respiratory tract infection.

CASE REPORT

A 16-year-old female presented to the emergency department of our hospital with a progressive non-productive cough over the last 2 weeks. She was a non-smoker, and there was no past history of a chronic disease. She had never consumed illicit drugs and had no allergies. She had visited an otorhinolaryngologist 10 days ago and was prescribed non-specific antibiotics with the diagnosis of acute pharyngitis.

The patient presented with a respiratory rate of 14 breaths/min, heart rate of 70 beats/min, and blood pressure of 120/70 mmHg. The 12-lead electrocardiogram was without any rhythm abnormalities. Chest auscultation revealed the presence normal lung sounds. No crepitus detected on both sides of the neck. There was no sign of an obvious upper respiratory tract infection. Hemogram and results of blood chemistry were within normal limits. Erythrocyte sedimentation rate was 8 mm/h and serum level of C-reactive protein was 0.1 mg/dl. Plasma level of D-dimer calculated by enzyme-linked immunosorbent assay was <500 µg/L and Well's score for pulmonary thromboembolism was 0.

Her chest radiograph demonstrated a linear air shadow along the left upper border of trachea (Figure 1). She gave no history of trauma. Thus, she underwent computerized

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tomography (CT) of the thorax with the prediagnosis of Hamman's syndrome and CT revealed the presence of air trapping in the mediastinum (Figure 2). There was no sign of a concomitant pneumothorax or subcutaneous emphysema.

The patient was hospitalized, and nasal oxygen therapy was administered during the bed rest. She was discharged on the 5th day of follow-up as her complaints disappeared. Last contact with her was a polyclinic visit for control 3 months after discharge, and she was free of all previous symptoms.

DISCUSSION

The pathophysiology of this syndrome was described by Macklin and Macklin based on the results of an animal study.⁵ According to their explanation, following the terminal alveolar rupture (primary pathology), alveolar air passes through the perivascular interstitial

tissue towards the hilum. Then, it reaches mediastinum and is being trapped among the mediastinal structures. Besides, pneumomediastinum may be complicated with subcutaneous emphysema or pneumothorax in 40-100% of the cases, if intrathoracic air leaks into the adjacent soft tissues.⁶

Hamman's syndrome occurs more frequent in young men. Although the exact incidence of this disease is still subject of debate, it is estimated to be present in approximately 1/30,000 emergency department referrals.⁷

Chest and neck pain, dyspnea, hypotension, dysphagia, subcutaneous emphysema, and cough are the common features of Hamman's syndrome. Chest pain is usually retrosternal and may radiate to the neck or into the back. In almost all cases, physical examination reveals no abnormality. Palpable crepitus is only can be detected in patients complicated with subcutaneous emphysema, so it may be absent in half of the patients.⁶ Precordial crunching sound synchronous with heart beat is the characteristic of this syndrome and called as Hamman's sign. However, again it is present approximately only in half of the cases. In this case, non-productive cough was the only symptom of the patient. There was no palpable crepitus and Hamman's sign was absent.

For the diagnosis of Hamman's syndrome, all other secondary causes of pneumomediastinum should be ruled out. These causes include penetrating or blunt trauma to the chest, forceful vomiting (Boerhaave's syndrome), medical procedures such as bronchoscopy and esophagoscopy, esophageal and tracheobronchial rupture, and dental procedures. Besides, some studies reported usage of cocaine and marijuana, and the presence of asthma (usage of bronchodilators) as the secondary causes of pneumomediastinum.^{6,8} All these secondary reasons were excluded in this case.

The high degree of suspicion is very important for the establishment of the diagnosis.⁹ There is no consensus on the investigation of this disease. Some authors point to the chest radiography (combination of posteroanterior and lateral graphs) as being sufficient in nearly all cases and CT is recommended only in doubtful cases.^{3,10} However, it should be remembered that chest radiography may be normal on admission and CT is the gold standard in detecting mediastinal air. CT is also accurate in diagnosing tracheobronchial and esophageal ruptures. Electrocardiography may demonstrate non-specific ST segment changes, reduced voltage, and axis deviations in some cases.¹¹ In this case, posteroanterior chest radiography revealed the presence of air shadow suggesting

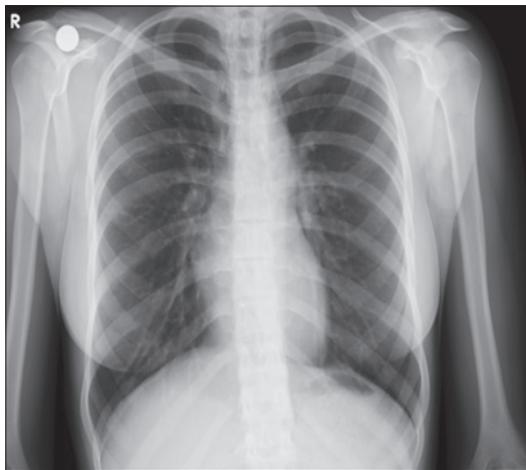


Figure 1: Chest radiograph of the patient on admission

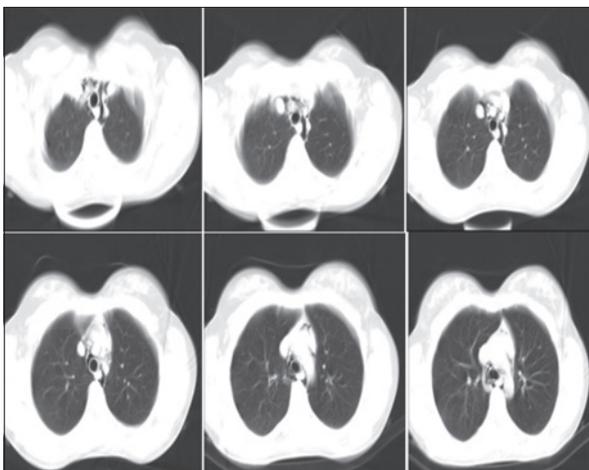


Figure 2: Thorax computerized tomography images of the patient on admission

pneumomediastinum and CT was ordered for the correction of the pre-diagnosis.

The treatment of this syndrome includes bed rest, analgesics if needed and oxygen administration. It is usually benign and non-recurrent. The patient should be hospitalized for a minimum of 24 h to prevent potential complications.⁸ In most cases, spontaneous pneumomediastinum resolves within several days, as seen in this case. Administration of antibiotics is only recommended in cases presented with signs of an infection or mediastinitis. However, there is also a life-threatening condition called as malignant pneumomediastinum which is characterized by the presence of excess air in the mediastinum. In such cases, subcutaneous aspiration and incisions may be required to evacuate mediastinal air, and if subcutaneous aspiration is not sufficient cervical mediastinotomy should be considered.¹²

CONCLUSION

Hamman's syndrome should always be kept in mind especially in young patients presenting with non-specific respiratory symptoms and if there is a suspicion further radiological evaluation should be performed.

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Peripheral Ossifying Fibroma of the Posterior Maxilla: A Rare Case Report

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Abstract

Arriving at a correct diagnosis of lesions with the similar clinical presentation is a tricky business. Localized gingival overgrowths, one of the most common encountered lesions in the oral cavity, has to be studied carefully to differentiate between pyogenic granuloma, irritation fibroma, peripheral central giant cell granuloma, and peripheral ossifying fibroma (POF). POF is a reactive lesion of the oral cavity which has been described under various names like cement-ossifying fibroma (OF), peripheral cemental OF, occurs in about 9% of all gingival growths, usually seen in anterior maxilla followed by anterior mandible and is more prevalent in females. Etiological factors include chronic irritation or trauma due to faulty restorations, ill-fitting dentures and calculus. This is a case presentation of POF seen in the posterior maxilla of a 13-year-old female patient. Surgical excision followed by histopathological confirmation was done to arrive at the diagnosis.

Key words: Bone neoplasm, Fibroma, Ossifying fibroma, Pyogenic granuloma, Swelling

INTRODUCTION

Fibromas are benign tumors that are composed of fibrous or connective tissue. Peripheral ossifying fibroma (POF) accounts for about 3.1% of all oral cavity tumors and about 9.6% of gingival overgrowths.¹⁻³

Ossifying fibroma (OF) is classified as a benign bone neoplasm. It is considered to be a type of fibro-osseous lesion. It consists of highly cellular and fibrous components along with varying amounts of calcified tissue that resembles bone, cementum or both. In 1968, Hamner *et al.* analyzed 249 cases of fibro-osseous jaw lesions of periodontal membrane origin and classified them. In 1973, Waldron and Giansanti reported 65 cases and concluded that this group of lesions was best described as lesions arising from cells in the periodontal ligament.^{4,5}

There are two types of OFs: The central type and peripheral type. The central type is believed to originate from the

endosteum and periodontal ligament around the root apex and subsequently causes expansion of the medullary cavity.¹ The peripheral type on the other hand arises from the periodontal soft tissue around the interdental papilla.⁶

OFs are generally seen in the second and third decade of life.⁷ There is a definite predilection for the maxilla in the oral cavity and females are generally affected 2-4 times more than their male counterparts.⁸ The etiology is unclear.⁹ Irritation of the tissue due to ill-fitting dentures, dental plaque, calculus, masticatory forces, faulty restoration, and trauma are proposed to be the initiating factors.⁷ The mineralized portion could have origination from the periosteal cells or periodontal ligament.¹

POF appears clinically as a soft pedunculated/sessile nodular mass, pink or red in color which may or may not be ulcerated. POF is believed to be clinically and histopathologically similar to a pyogenic granuloma, but it undergoes fibrous maturation and subsequent calcification.¹ Racial predominance has been reported where 71% of whites against 31% blacks were affected.

CASE REPORT

A 13-year-old female patient reported to the Department of Oral Medicine and Radiology with the chief complaint

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of a swelling of the gum in the upper left back tooth region since 2 months. The patient was apparently well when she noticed the swelling 2 months ago.

The swelling was gradual in onset, small in size initially and gradually increased to the present size. The growth was continuous in nature without any periods of remission or exacerbations. The swelling was associated with a gradual and continuous pain which was localized, throbbing type and mild in intensity, which aggravated on brushing. Bleeding from the swelling was also noticed while brushing. Her past medical and dental histories were non-contributory.

On intraoral examination (Figure 1), an oval shaped pedunculated swelling of size 1.8 cm × 1.2 cm with an irregular surface was seen arising from the marginal gingival of 27 extending anteroposteriorly from middle third of palatal aspect of 27-1 cm distally. The overlying mucosa was erythematous with no ulceration. On palpation, all inspectory findings were confirmed. The swelling was firm in consistency at the center and soft toward the periphery. The swelling was tender, and bleeding was noticed on palpation.

On the basis of history and clinical examination, we arrived at a provisional diagnosis of pyogenic granuloma. Clinically, the differential diagnosis of POF, traumatic fibroma, and peripheral giant cell granuloma were considered.

Radiographic and histological investigations were then carried out. The intra-oral periapical radiograph (Figure 2) and orthopantomography (Figure 3) of 27 regions revealed flecks of radio-opacity in the area distal to 27.

Following radiographic investigations, the radiographic diagnosis was decided as POF.

After routine blood examination, excision biopsy (Figure 4) was done under local anesthesia along with curettage of the periodontal ligament and periosteum to reduce the chances of recurrence.

The histopathological picture Figures 5 and 6 shows an ulcerated keratinized stratified squamous surface epithelium in association with a cellular connective tissue exhibiting spindle-shaped and stellate-shaped cells and collagen fibers, exhibiting numerous globular, hematoxiphilic calcified masses within the connective tissue. In many foci lamellated bone formation can be seen with osteocytes within osteocytic lacunae within the connective tissue.

Correlating the clinical and investigative findings a final diagnosis of the lesion was established as POF. The patient was kept under follow-up (Figure 7).

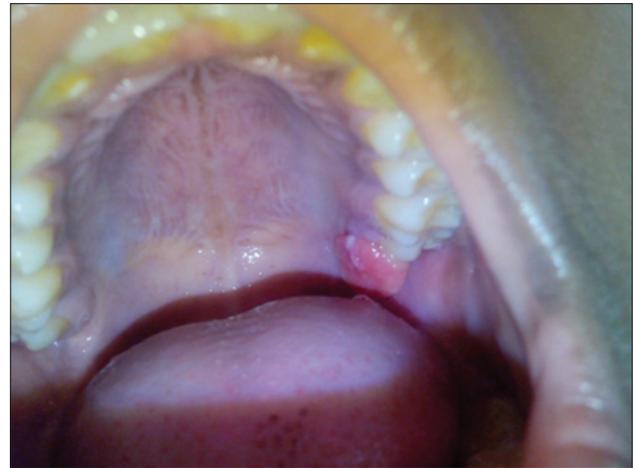


Figure 1: Intraoral picture of the lesion

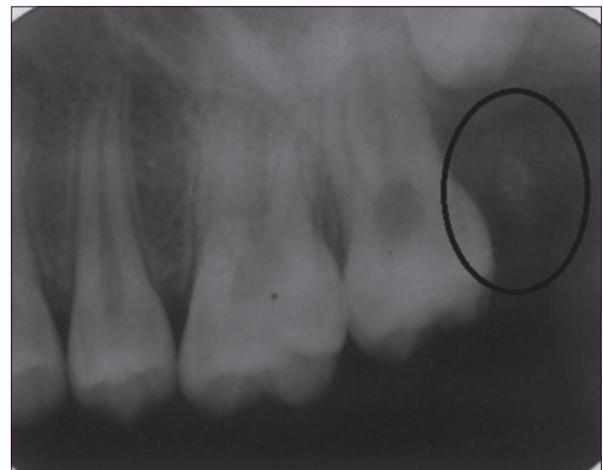


Figure 2: Intraoral periapical radiograph showing calcified flecks distal to 27



Figure 3: Orthopantomography showing calcified mass distal to 27

DISCUSSION

WHO defines POF as a demarcated or rarely encapsulated neoplasm consisting of fibrous connective tissue containing varying amounts of mineralized material resembling bone or cementum.⁸



Figure 4: The excised mass of size 1.8 cm x 1.2 cm

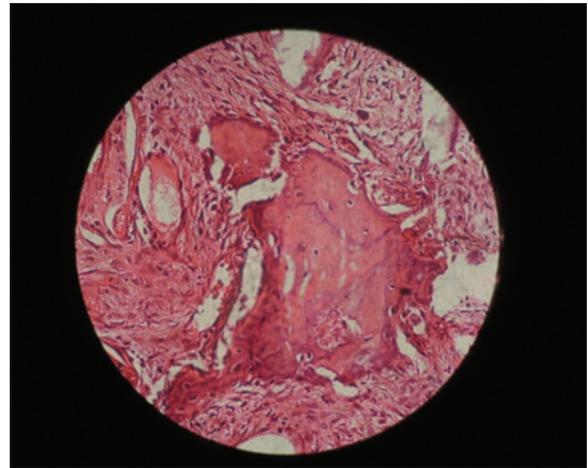


Figure 6: Histopathological picture under x40

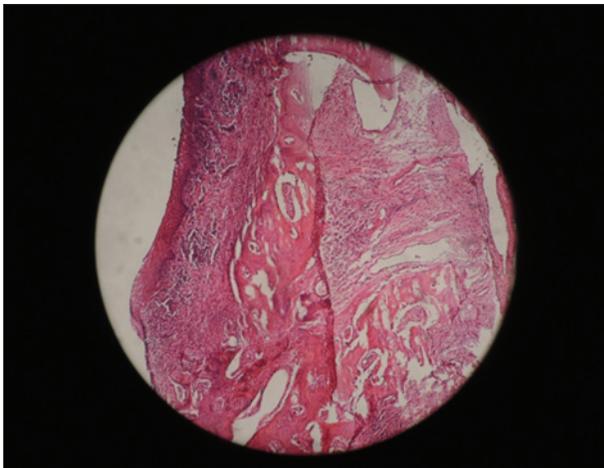


Figure 5: Histopathological picture under x10



Figure 7: Follow-up image after 6 months

POF has been described under various names such as epulis, calcifying cementoblastic granuloma, peripheral cementifying fibroma, and peripheral fibroma with cementogenesis, peripheral cement-OF, ossifying fibroepithelial polyp, and peripheral fibroma with osteogenesis.^{5,7,9} Menzel first described OF in 1872, but Montgomery assigned a name to it only in 1927. The term POF was coined by Eversol and Robin.^{2,7}

Etiopathogenesis of POF has been uncertain though origin from the cells of the periodontal ligament has been suggested. This could be because of occurrence of POF exclusively in the interdental papilla; presence of oxytalan fibers in the mineralized matrix;^{1,5} age distribution of the lesion is inversely proportional to the number of teeth lost and the histological picture related to the fibro cellular component is similar to the lesions arising from the gingival.⁵

POF is a fairly common lesion, comprising nearly 1-3% of oral gingival growths. Clinically, the POF presents

as an exophytic, smooth surfaced, pink or red nodular mass that is sessile. These features are consistent with the findings in our case. Approximately, 60% of POFs occur in females with predilection for maxilla, and more than 50% of all cases occur in the incisor-cuspid region.^{2,8} However, in our case the lesion was seen in the posterior maxilla which is unusual. Hormones seem to play a role in the progress of the lesions accounting for the female predilection.⁶

Clinically differential diagnosis for gingival growths includes fibroma, peripheral giant cell granuloma, pyogenic granuloma, peripheral odontogenic fibroma, and POF.^{2,8} A confirmatory diagnosis of POF is made by histopathologic evaluation of biopsy specimens. The following features are usually observed during the microscopic examination; intact or ulcerated stratified squamous surface epithelium; benign fibrous connective tissue with varying numbers of fibroblasts; sparse to profuse endothelial proliferation; mineralized material consisting of mature, lamellar or woven osteoid, cementum-like

material or dystrophic calcifications; and acute or chronic inflammatory cells in lesions.⁴

Surgical excision is the preferred choice of treatment for POF. In addition, any identifiable irritant such as an ill-fitting dental appliance and faulty restoration should be corrected.⁹

The recurrence rate for POF has been reported to vary between 8.9% and 20%.⁶ It could be because of incomplete removal during surgery, repeated injury or persistence of the local irritants. It is important to remove lesion completely including the periosteum and periodontal ligament along with the possible cause, to bring down the chances of recurrence.^{10,11}

CONCLUSION

POF is benign, slowly progressive reactive lesion which is difficult to differentiate with other reactive lesions of the oral cavity. The lesion is usually seen in the anterior maxilla, but the presence of this lesion in the posterior maxilla makes this case a rare entity. Histopathologic confirmation is mandatory. Complete surgical excision

down to the periosteum is the preferred treatment. As the recurrence rate is high (8-20%) close post-operative follow-up is required.⁶

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Heterotopic Pancreas in Gastric Antrum: A Report of Two Cases

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Abstract

Pancreatic glandular tissue situated outside the normal anatomical site of the human body is called heterotopic pancreas. The incidence is very low as mostly it remains asymptomatic. It is usually found in association with stomach and duodenum, but it may be found in relation with any organ and even outside the abdominal cavity. When symptomatic, it may present as pain in the abdomen, pancreatitis, gastrointestinal tract bleed, abscesses, cysts, or malignancy of the concerned organ. Gastric ectopic pancreas is diagnosed by ultrasonic endoscopy and tissue biopsy. Conservative treatment gives a temporary relief. Local wedge resection of this non-malignant lesion is the ultimate treatment of choice. In the present study, we report cases of ectopic gastric antral pancreas in two young males aging 20 and 16 years who happened to be cousins. They presented with vague symptoms of epigastric pain, nausea, vomiting, etc. One of the patients had h/o melena. The diagnosis was made by endoscopic ultrasonography and confirmed by endoscopic biopsy. This study further supports the genetic theory of ectopic pancreas as there could be a common type of abnormal genetic signaling pathway leading to trans-commitment of non-pancreatic tissue progenitors to pancreatic lineage in both patients leading to a common type of ectopic pancreatic pathology.

Key words: Abnormal organogenesis, Endoscopic ultrasonography, Gastric antrum, Heterotopic pancreas

INTRODUCTION

Heterotopic or ectopic pancreas is defined as the presence of abnormally located pancreatic glandular tissue with no structural and vascular connection with main pancreas. Most of the heterotopic pancreatic lesions are asymptomatic and are found incidentally along gastrointestinal tract (GIT) during endoscopic examinations, laparotomies, and autopsies. However, this anomalous pancreatic tissue may present as various types of acute or chronic gastrointestinal manifestations. Eventually, many serious complications may develop including upper GI bleeding, gastric ulcers, pyloric obstruction, pancreatitis, pseudocysts, abscesses, or even malignant degenerations.¹ The incidence of ectopic pancreas seen at autopsies ranges between 5% and 13.7%. It is more common in the age group of 30-50 years, having

male predominance, with male to female ratio as 3:1.² The most recognized locations of ectopic pancreatic tissue includes: (1) Proximal duodenum (17-36%), (2) gastric antrum including gastric duplication cysts - 25-38%, (3) jejunum - 15-21%, (4) Meckel's diverticulum 5.3%, and (5) ileum 5.8%. Less common regions involved are esophagus, gallbladder, common bile duct, spleen, mesentery, mediastinum, periampullary site of duodenum, and fallopian tube 7%;^{1,2} least common sites being tongue, submandibular salivary gland, and lymph node.³

Most of the time, the heterotopic pancreas is located in the stomach where it is maximally seen in the antrum; either on the posterior wall or anterior wall, being more common along the greater curvature. The involvement of submucosal layer, muscularis, and subserosal layer is 73%, 17%, and 10%, respectively. The macroscopic appearance is that of a benign firm submucosal mass on a broad base, sharply circumscribed from the surrounding tissue. The diagnostic tools include contrast radiography, computerized tomography (CT) scan, and endoscopic ultrasonography (EUS).¹ Findings of endoscopy of upper GIT: The typical endoscopic finding is a firm round or oval subepithelial lesion with a central umbilication or depression, which

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corresponds to the opening of a duct. This central dimpling or umbilication implies a presumptive diagnosis of ectopic pancreas during preoperative endoscopy.⁴ The findings may sometimes be also that of polypoid mass (submucosal or muscularis growth) with central umbilication. The tissue area appears as discrete, yellowish gray nodules with well-defined lobules of acinar tissues that may be replete with islets of Langerhans as well as exocrine glands. The nodules are small (1-3 cm) in diameter though lesions in the stomach are usually larger than other sites averaging 2.4 cm.⁵ However, these findings are not present in all the patients. In these patients, EUS would be helpful for predicting ectopic pancreas.⁴ The characteristic EUS features of ectopic pancreas reported are as: (1) Indistinct borders, (2) heterogeneous echogenicity, (3) the presence of an anechoic area, and its location within the second, third, fourth, or fifth layers of the stomach.⁴

Classification of Heterotopic Pancreas

Based on the sonographic appearance of the layer of origin, ectopic pancreas is classified into two types:

1. Superficial type (s-type)
2. Deep type (d-type).⁴

Histological classification⁵

Heinrich classified heterotopic pancreas histologically into three types: Type 1 - Showing all the components of pancreas such as ducts, acini, and endocrine islets, Type 2 - Showing ducts type with acini, Type 3 - Showing ducts with only a few acini or dilated ducts only, the so called adenomyoma.

Etiology

Two important factors are recognized; they are:

Embryological factors

- a. Buds of embryonic tissue penetrate into the wall of rapidly growing intestine with a consequent of separation from the main pancreas and subsequent autonomous growth¹
- b. An inappropriate expression of pluripotent embryonic mesenchymal tissue of the gastrointestinal tract with subsequent development of pancreatic tissue^{1,3}
- c. According to Derbyshire RC, prior to the fusion of the ventral and dorsal pancreatic buds, small branches from them may become attached to the gut wall at various locations. These branches remain anchored to the gut wall and as the pancreatic gland pulls away from the gut, these remain grafted in its new location on the gut wall and develop as heterotrophic pancreatic tissue.³

Genetic factors

1. Hes-1 - Main effectors of Notch signaling pathway regulates fate and differentiation of many cell types during the development including region - appropriate specification of pancreas in the foregut endoderm

through the regulation of expression of Ptf1a (a transcription factor). Any deviation and abnormality in this pathway is considered to be responsible for the pathogenesis of ectopic pancreas⁶

2. Pancreatic and duodenal homeobox gene-1 (Pdx1) is region - specific transcriptional regulators playing a pivotal role in pancreas organogenesis. Pdx1 - Null mutants have an early block in pancreas formation⁶
3. Transforming growth factor-B, (TGF-B), fibroblast growth factor (fgf), notch and hedgehog signaling pathways regulate and interact with each other to govern pancreas development; anything going wrong with their interactive activity leads to anomalies⁷
4. Inhibition of sonic hedgehog (shh) leads to ectopic development of pancreatic tissue⁶
5. Trans-commitment of non-pancreatic tissue progenitors to pancreatic lineage.⁶

CASE REPORTS

We present the case reports of two patients who are Afghani nationals and happen to be distant cousins.

Case I (Figures 1-3)

A 21-year-old male from Afghanistan visited the Department of Gastroenterology of a private super specialty hospital at New Delhi, with H/O vague pain in the upper abdomen and chronic dyspepsia for a period of 1-year. There was no H/o weight loss, malena, haemetamesis, drug intake for any chronic disease, etc.

General physical examination

All parameters were within normal limits. Abdominal examination revealed tenderness in epigastric and umbilical region on deep palpation. Routine blood, urine, stool, and all biochemical tests were within the normal range. The

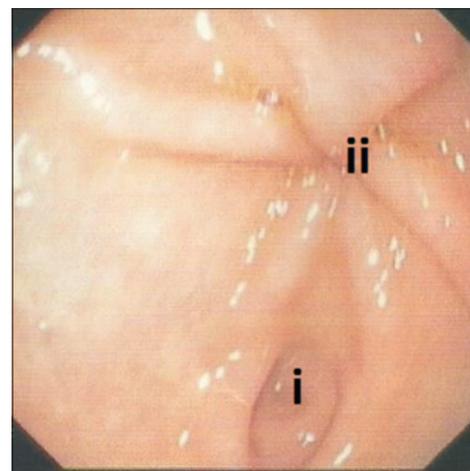


Figure 1: Plain endoscopic images of the stomach (Case I). Gastric antrum showing, (i) A simple umbilicated lesion, (ii) closed pyloric end of the stomach

patient was advised for plain endoscopy followed by EUS of upper gastrointestinal organs.

Endoscopic report

A small umbilicated lesion of the size of 5 mm was noted in the antrum of the stomach. The surface of the lesion appeared smooth without any features of ulceration. Small erosion at the incisura of lesser curvature and the features of gastritis in the mucosa of antrum were noted. Rest of the stomach and duodenal mucosa looked normal. This was followed by EUS of stomach and duodenum.

EUS report

The mucosal umbilicated lesion seen in plain endoscopy was assessed and found to be 2 mm × 4 mm in size. It arose

from 3rd and 4th gastric layer, the lesion was heterogeneous with hypo echogenic patchy echostucture; no distinct ductal component was noted; the outer serosal layer was intact, with no adjacent lymphadenopathy noted. All these features were suggestive of the aberrant gastric antral pancreas. For confirmation of diagnosis, an EUS-guided TRU- Cut biopsy was performed and sent for evaluation. The patient was put on conservative treatment and referred to the surgical unit for further treatment and course of action.

Case II (Figures 4-6)

A young, 16-year-old boy, was admitted to the causality department of the same hospital (as mentioned above) with H/O acute pain epigastric region and vomiting. On enquiring, he gave past H/O recurrent attacks of pain in upper abdomen, nausea, vomiting, and generalized weakness for the last 3 months, with a past H/O of melena once. There was no H/O drug intake, hematemesis, jaundice, etc.

General physical examination

There was mild anemia; rest all of the parameters were within the normal limits. Routine blood, urine, stool, and biochemical tests were normal except for hemoglobin level, which was 9 g%.

Endoscopic report

A 2 cm raised subepithelial lesion with a dimpled surface in the antral region was visualized. On the surface of the lesion and extending to the adjacent gastric antral mucosa, there was 1 cm clean based ulcer. The whole of the antral mucosa was hyperemic showing features of severe gastritis. Rest of the gastric and duodenal mucosa was looking normal.

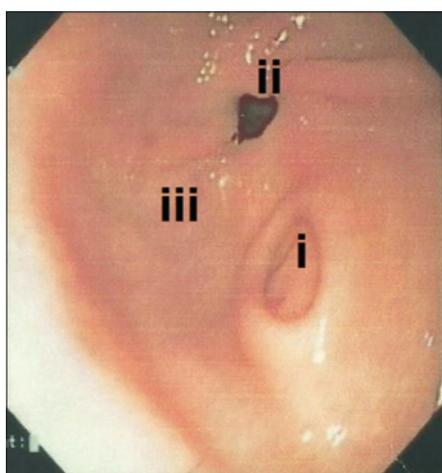


Figure 2: Plain endoscopic images of the stomach (Case I). (i) Gastric antrum showing the same simple umbilicated lesion suspicious of ectopic pancreas, (ii) pyloric end open, (iii) features of acute gastritis in the antral mucosa

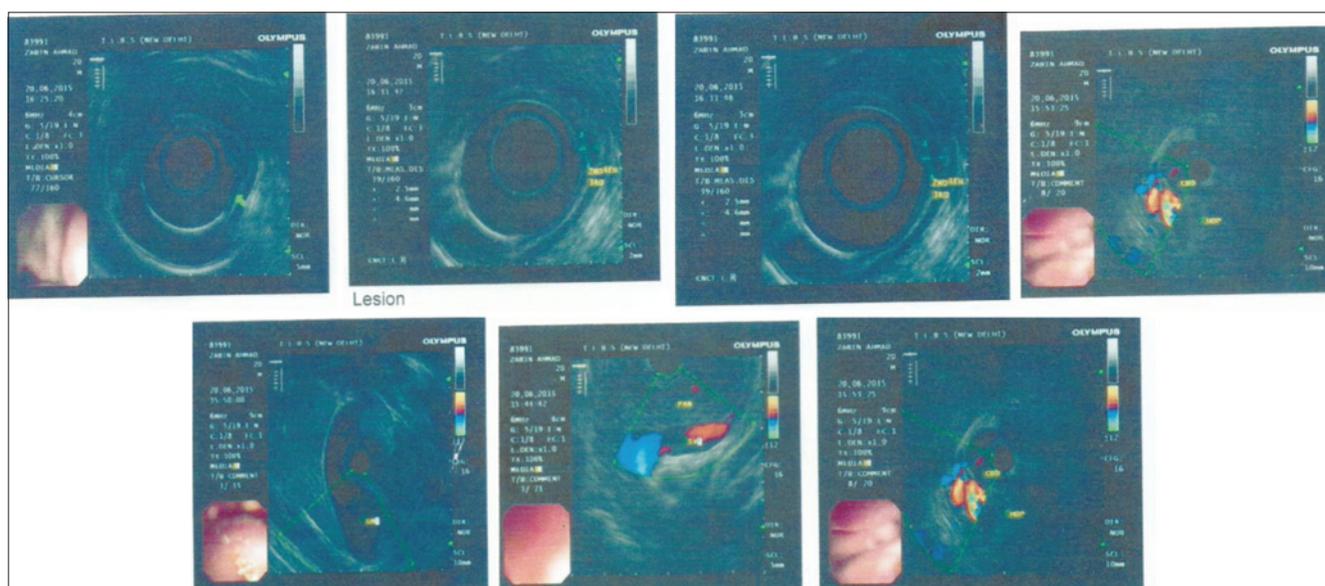


Figure 3: Ultrasonographic endoscopic images of the gastric antrum. Various images of the interior of gastric antrum showing the umbilicated lesion arising from 3rd and 4th layers, is heterogeneous in nature with hypo echogenic patchy echostucture

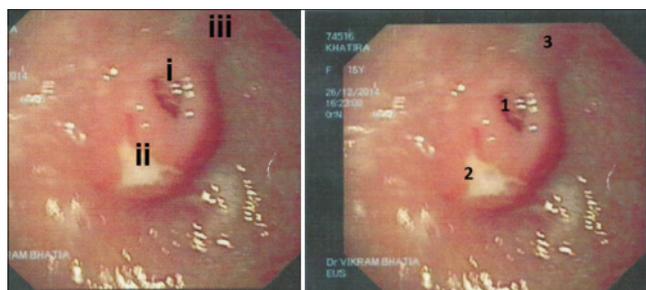


Figure 4: Plain endoscopic images of gastric antrum (Case II). (i) A raised subepithelial lesion with a dimpled surface seen in the gastric antrum, (ii) a clear-based ulcer on the surface of the lesion, (iii) hyperemic antral mucosa

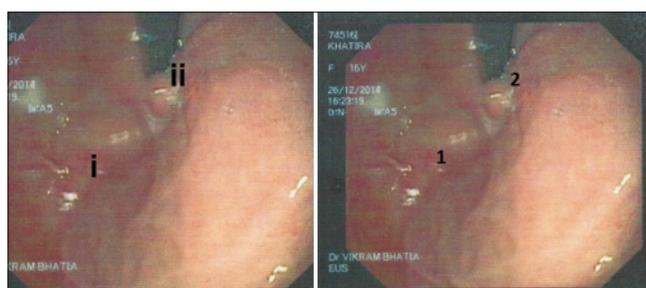


Figure 5: Plain endoscopic images of gastric antrum (Case II). (i) Hyperemic antral mucosa, (ii) pyloric end open

EUS report

There was a 16 mm × 8 mm mural lesion in the antrum of the stomach. The location of the lesion was in the deep mucosal and submucosal layers, with extension into the muscularis propria layer. There was no extension through and beyond the muscularis propria. The margins of the lesion were ill-defined. The internal echotexture was heterogeneous, with hypo echogenic pathy/lobular echo structure. Besides, anechoic irregular tubular structures were present in the lesion. No enlarged perigastric lymph nodes were seen. A EUS guided Tru-Cut biopsy was also performed for the confirmation of diagnosis.

Plain endoscopy and EUS findings were suggestive of pancreatic rest/ectopic pancreatic tissue with an antral benign clean-based ulcer. This patient was also treated conservatively and was then referred to the surgical unit for simple resection or endoscopic mucosal resection.

DISCUSSION

The pathological condition - Ectopic pancreas has been found to be associated with various organs of the body, mostly upper GIT. Hence, its presentation is also varied. The condition was diagnosed very early in the 18th century. Schultz, in 1727, was the first to report the incidence of heterotopic pancreas¹ which was found in upper GIT in an ileal diverticulum during the autopsy of a new born.³

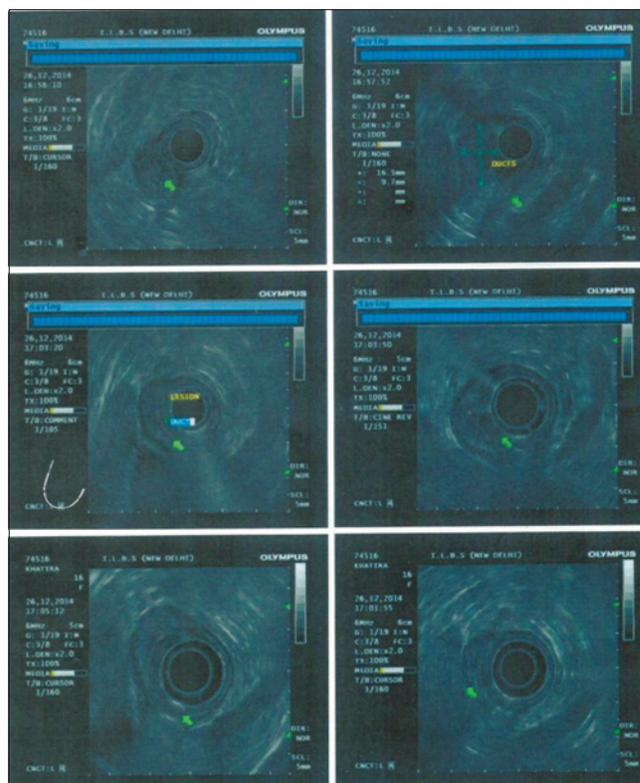


Figure 6: Endoscopic ultrasonography images of gastric antrum. Hyperemic antral mucosa suggestive of severe gastritis and pyloric end open. Various images of the interior of gastric antrum showing a big mural lesion lying in the deep mucosal and submucosal layers with extension into muscularis externa. The interior echo texture is heterogeneous, with hypo echogenic lobular echo texture. An echogenic, irregular tubular structures presence in the lesion

Klob published his first microscopic list of observations of ectopic pancreas in 1859.^{1,3} Later on after a gap of more than one century, a large series of about 212 cases of heterotrophic pancreas were published by Dolan *et al.*¹ A 60-year-old patient with hiatus hernia had ectopic pancreatic tissue at the esophago-gastric junction, which was presented as ductal adenocarcinoma. Malignant changes at such gastric sites are rare.⁸ Hlavaty *et al.*, in 2002, identified an 8 mm gastric hemispherical polyp as a case of heterotopic pancreas in a 60-year-old woman.¹

Out of 105 gastrotomies performed in the past 5 years, ectopic pancreas was found only in one case, i.e. 0.9% by Christodoulidis *et al.*, in their study. They reported a case of ectopic pancreas in gastric antrum, measuring 5 cm × 3 cm × 4 cm extending into the submucosa and partially into muscularis externa.²

Basilios Papaziogas *et al.* confirmed ectopic pancreas with endoepithelial carcinoma of gastric antrum in a female of 56 years of age.⁵ A 25-year-old lady was diagnosed as a case of ectopic pancreas in the gastric fundus at gastroesophageal junction. The histological findings of the biopsy specimen

of the same patient were reported as gastric heterotopic pancreas with pancreatic intraepithelial neoplasm-2 which is believed to represent a precursor lesion for the development of ductal adenocarcinoma.⁹ Various sites other than the stomach, where ectopic pancreas was diagnosed by various researchers are: A 5-year-old child with a diagnosis of Meckel's diverticulum was found to have heterotopic pancreatic tissues in the various parts of the gastrointestinal tract by Baysoy *et al.*¹⁰ An isolated heterotopic pancreas, at the terminal ileum of a 47-year-old male, was found to be the cause of ileo-ileal intussusception by Ahmed Monier *et al.*¹¹ Heterotopic pancreas in the spleen with malignant degeneration to mucinous cyst adenocarcinoma was reported by Nisar *et al.*¹²

A case of heterotopic pancreas adjacent to ampulla of Vater mimicking cholangiocarcinoma was reported by Atindriya Biswas *et al.* in UK.³ Goodarzi *et al.* reported a case of pancreatic heterotopia in the rectum of a 42-year-old female in whom it had turned into ductal adenocarcinoma.¹³ An 18-year-old post-pubertal girl having an H/O cholecystitis was diagnosed as a case of heterotopic pancreas in the gallbladder, the ectopic pancreas being responsible for cholecystitis.¹⁴ A 45-year-old healthy lady who went for a routine medical check-up was found to have soft tissue mass in the left lobe of liver on CT scan. Left hepatic lobectomy was performed and subsequent histopathological study of the mass removed revealed the presence of ectopic pancreatic tissue present in the liver. This intrahepatic pancreatic tissue had changed into adenocarcinoma.¹⁵ Lizhi-Zhang *et al.* reported two very rare cases of ectopic pancreatic mass in anterior mediastinum of thoracic cavity in two young females who were 15 and 16 years old respectively.¹⁶

CONCLUSION

Although pancreatic heterotopia is a rare entity, yet it should always be considered in the differential diagnosis of extra mucosal gastric lesion/GI stromal tumor and any undiagnosed abdominal ailment. The quick and easy diagnostic tool is to do EUS and a simultaneous biopsy.

Such diagnostic procedures are all the most important in the cases where pancreatic heteropenia presents primarily as pancreatitis, hyperinsulinism, Zollinger Ellison syndrome, common bile duct obstruction, etc. It is often impossible to distinguish gastric pancreatic heterogenic tissue from primary or metastatic cancer on endoscopy because endoscopic biopsies are sometimes unremarkable. Hence, a frozen section should be taken at the time of surgery to confirm

the diagnosis. Surgical excision provides symptomatic relief and treatment also. Surgery is recommended, especially if the diagnosis is uncertain. Our case study of two patients revealed that ectopic pancreas can also be present at a young age as described by a few authors rather than conventionally declared in the third or fourth decade of life. Our patients had the same diagnosis and were also related to each other. This fact further enlightens the role of genetic theory in the pathogenesis of ectopic pancreas. It is presumed that both of them had some common genetic pattern and abnormal genetic signaling pathway which predisposed to the formation of ectopic pancreas in both individuals, that too involving antrum of the stomach in both cases.

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Stone in the Scrotum: Scrotal Calcinosis Cutis: A Rare Case Report

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Abstract

Scrotal calcinosis is a rare benign disorder involving scrotal skin resulting from deposition of calcium within the dermis. It was first described by Lewinsky in 1883. Deposition of calcium in the skin, subcutaneous tissue, muscles, and visceral organs is known as calcinosis and it more commonly involves skin and it is called calcinosis cutis. It usually presents as slow growing asymptomatic multiple hard to firm nodules. Pathogenesis is still under debate as to whether the calcification is dystrophic or idiopathic. Excision is the treatment of choice followed by primary closure or scrotal reconstruction using split-thickness skin graft. Recurrence is rare. In this article, we report a case of idiopathic scrotal calcinosis cutis which was treated by primary excision at our institute. We have also reviewed the relevant literature.

Key words: Calcifications, Calcinosis, Dermis, Scrotum, Skin diseases

INTRODUCTION

Idiopathic scrotal calcinosis is a rare benign condition with painless slow growing nodular masses within the dermis of the scrotal skin. It was first described by Lewinsky in 1883.¹⁻³ Deposition of calcium in the skin, subcutaneous tissue, muscles, and visceral organs is known as calcinosis, and it more common involves skin and it is called calcinosis cutis. There are four types of calcinosis cutis based on their etiology such as dystrophic, metastatic, iatrogenic, and idiopathic.¹ Age group is 20-40 years.⁴⁻⁶ Various theories on pathogenesis have been proposed by authors favoring idiopathic and dystrophic calcification. In dystrophic calcification, calcification occurs as a consequence of pre-existing condition such as an epidermal cyst, etc. and when there is no evidence

of pre-existing pathology it is termed as idiopathic scrotal calcinosis. Metastatic calcifications are usually generalized and due to metabolic changes such as hypercalcemia and hyperphosphatemia as in end-stage renal diseases and hyperparathyroidism and dermatomyositis.^{7,8} Pabuccuogh *et al.* proposed degeneration and necrosis of dartos muscle as the reason for calcification which is supported by King *et al.*, Fischer *et al.*, Armjo *et al.*, and Kelten *et al.*⁷ Ito *et al.* described scrotal calcinosis is consequence of excessive discharge and accumulation of material debris in lumina of eccrine epithelial cyst using immunohistochemistry which showed slight positivity for antibodies to sulfated mucopolysaccharides.⁴ Shapiro *et al.* 14 case series proposed scrotal calcinosis is idiopathic as there is no epithelial lining around calcium deposition, keratin remnants, granulomatous reaction and, inflammation infiltrates which is supported by Shal *et al.*, Parlakgumus *et al.*, Anureet *et al.*, Wright *et al.*, Karaca *et al.*, and Dombale *et al.*^{1-3,8} Fukaya *et al.* and Ueds *et al.* mentioned role of mast cell in formation of calcification.^{7,9} Dini *et al.* proposed the term “idiopathic” can be used if the cause is not known⁷ as in our case. In our case, we are reporting a case of idiopathic scrotal calcinosis evidenced by the lack of inflammatory and

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epithelial cells. In this article, we have also elaborated the available literature on scrotal calcinosis.

CASE REPORT

A 45-year-old diabetic male patient presented with painless multiple swelling in the scrotum for 8 years which gradually progressed over the years. He neither gave any history suggestive of metabolic disorder, hormonal derangement, sexually transmitted diseases, nor trauma. On examination, multiple yellowish, firm nodules present in the scrotal skin with no ulceration or discharge. (Figure 1) The patient's blood picture, blood sugar, serum calcium, phosphate, parathyroid hormone, calcitonin, and vitamin D levels are within normal limits. (Figure 2) Excision of the nodules from the scrotal skin was done. Grossly excised specimen is about 4 cm × 3 cm × 2 cm and chalky white areas were seen below the skin on cut section. (Figure 3) Microscopic picture shows epidermis and dermis with multiple foci of calcium deposits in the

subcutaneous tissue with no malignancy or inflammatory cells seen. (Figure 4)

DISCUSSION

Idiopathic scrotal calcinosis is a rare benign condition with painless slow growing nodular masses within the dermis of the scrotal skin.^{1,2} Incidence of the disease is not known.¹ It was first described by Lewinsky in 1883.¹⁻³ Deposition of calcium in the skin, subcutaneous tissue, muscles, and visceral organs is known as calcinosis, and it more commonly involves skin and it is called calcinosis cutis. There are four types of calcinosis cutis based on their etiology such as dystrophic, metastatic, iatrogenic, and idiopathic.¹

Scrotal calcinosis is usually asymptomatic but occasionally causes heaviness, itching, ulceration, and chalky white



Figure 1: Pre-operative picture

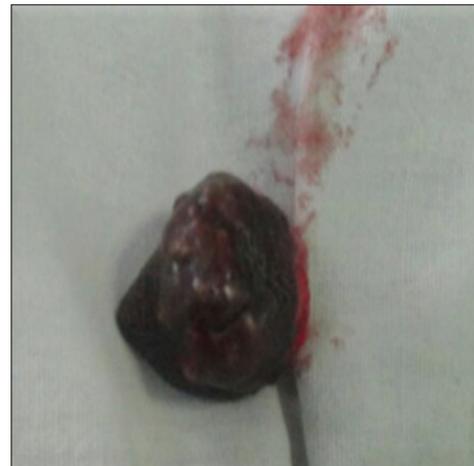


Figure 3: Excised specimen



Figure 2: Post-excision skin gap

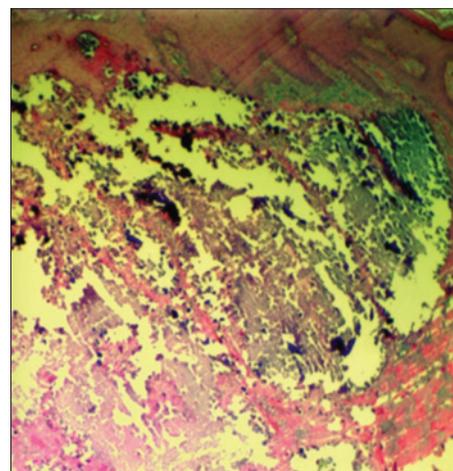


Figure 4: Epidermis and dermis with multiple foci of calcium deposits in the subcutaneous tissue with no malignancy or inflammatory cells seen

exudative discharge.^{2,4,6,8} The patient mainly comes for cosmetic reasons.⁸ Age group is 20-40 years, youngest and oldest reported are 9 and 85 years, respectively.^{2,4,6} Initially, it resembles the color of scrotal skin later it changes into yellow, and duration is about 10 years ranging from 3 months to 46 years.⁸

Microscopic picture shows amorphous basophilic calcium deposits within dermis surrounded by lymphocytic infiltration, histiocytes, and hyalinization.^{2,6-8} Histological picture shows muscle, epithelial cells, and foreign body granuloma during early stage and it shows only calcification in the advanced stage.²

The pathogenesis is still in the debate, various theories have been proposed by authors favoring idiopathic and dystrophic calcification. In dystrophic calcification, there must be a local favoring condition such as pre-existing epidermal cyst, eccrine duct milia, eccrine epithelial cyst, degenerated dartos muscle, and connective tissue disorders such as scleroderma, systemic lupus erythematous, dermatomyositis, and minor trauma. Squamous cell epithelial lining may present, and patient has normal serum calcium and phosphorus levels.¹

Song *et al.* described spectrum of changes takes place in scrotal calcinosis as mild to moderate inflammation of epidermal cyst is followed by mononuclear cell infiltration and foreign body granuloma formation and lastly resorption of cyst wall and keratin remnants leaving calcium deposits only^{8,9} which is supported by Swinhart *et al.*, Akosa *et al.*, Saad *et al.*, Dubey *et al.*, Parlakgumus *et al.*, and Dini and Colatraneschi *et al.*^{2,6,8}

Pabuccuogh *et al.* proposed degeneration and necrosis of dartos muscle as the reason for calcification which is supported by King *et al.*, Fischer *et al.*, Armjo *et al.*, and Kelten *et al.*⁷ Ito *et al.* described scrotal calcinosis is consequence of excessive discharge and accumulation of material debris in lumina of eccrine epithelial cyst using immunohistochemistry which showed slight positivity for antibodies to sulfated mucopolysaccharides.⁴

Dare and Axelson *et al.* supported scrotal calcinosis arising from pre-existing eccrine milia using immunohistochemistry which showed antibodies to carcinoembryonic antigen.⁶ Carson *et al.* described sequences following minor trauma and invasion of nanobacteria and formation of calcium apatite crystals.⁶ Veress and Feinstein *et al.* favored minor trauma following which calcification occur.¹⁰

Metastatic calcifications are usually generalized and due to metabolic changes such as hypercalcemia and hyperphosphatemia as in end-stage renal diseases

hyperparathyroidism and dermatomyositis involving visceral organs and joints.^{8,11,12} Pallavi *et al.* reported as case of scrotal calcinosis due to normocalcemic hyperparathyroidism which doesn't need parathyroidectomy unless symptomatic.¹¹

Shapiro *et al.* 14 case series proposed scrotal calcinosis is idiopathic as there is no epithelial lining around calcium deposition, keratin remnants, granulomatous reaction, and inflammation infiltrates which is supported by Shal *et al.*, Parlakgumus *et al.*, Anureet *et al.*, Wright *et al.*, Karaca *et al.*, and Dombale *et al.*^{1-3,8} Fukaya *et al.* and Ueds *et al.* mentioned role of mast cell in formation of calcification.^{7,9} Dini *et al.* proposed the term "idiopathic" can be used if the cause is not known⁷ as in our case. Idiopathic and dystrophic calcifications are usually involves one general area (calcinosis circumscripta). The iatrogenic calcifications mainly occur at the site of invasive procedure due to tissue damage.¹²

Differential diagnosis are teratoma, gonadoblastomas, leydig cell tumors, calcified onchocercoma, neurofibroma, ancient schwannomas, steatomas, lipomas, fibromas, and scrotal calcinosis may also be due to chronic epididymitis, calcified appendix testis, appendix epididymis, and sperm granuloma due to sperm extravasation and hematoma.^{4,8}

Diagnosis is confirmed by biopsy. If swelling is <4 mm, pinch and punch excision is advised.⁸ Surgery is the treatment of choice.^{4,8} If it is massive, subtotal excision of the scrotal wall is preferred. If it is extensively involved, excision followed by complex scrotal reconstruction using meshed split thickness skin graft as the scrotal skin is rugged.⁸ Recurrence is very low mainly due to microscopic foci of calcification left over.⁸

CONCLUSION

Idiopathic scrotal calcinosis cutis is a rare benign lesion. Metabolic and hormonal work-up is required to rule out other causes. Irrespective of the etiology, surgical excision is required both for confirming the diagnosis as well as for treatment. Scrotal calcinosis must be included in the differential diagnosis of cutaneous swellings in the scrotal region.

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Herlyn–Werner–Wunderlich Syndrome-Early Diagnosis with Ultrasonography in a 3-month-old Female Child

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Abstract

Herlyn–Werner–Wunderlich syndrome is an uncommon, complex uterine anomaly - obstructed hemivagina with ipsilateral renal agenesis, usually presenting in adolescence. Here we report a rare presentation of this entity in a 3-month-old child, diagnosed on transabdominal ultrasonography alone. The patient underwent surgery wherein imaging findings were confirmed, and vaginoplasty was done. We present this case to highlight the role of ultrasonography in diagnosing this condition even though magnetic resonance imaging is the most accurate imaging modality in diagnosing this condition; and also the early age of presentation which is unusual. We describe the findings on ultrasound along with a review of the literature on Herlyn–Werner–Wunderlich syndrome.

Key words: Hemivagina, Ipsilateral renal agenesis, Mullerian anomalies, Obstructed hemivagina with ipsilateral renal agenesis syndrome, Uterus didelphys

INTRODUCTION

Herlyn–Werner–Wunderlich syndrome is a rare Mullerian duct and Wolffian duct anomaly with uterus didelphys, unilaterally obstructed hemivagina, and ipsilateral renal agenesis (OHVIRA).¹ Due to functional patency of hemivagina and normal menstrual cycles, this type of obstructive anomaly initially remains unrecognized, usually presenting at puberty with recurrent pelvic pain and/or mass due to hematocolpos or hematometra. Moreover, the menstrual flow that comes from the patent hemivagina resembles normal menses leading to delay in diagnosis and surgery.^{2,3} Developmental abnormalities of Mullerian duct have an estimated incidence of 1.1-3.5% among women.^{4,5}

CASE REPORT

The 3-month-old child was presented with a swelling at the introitus noticed by the mother; there were no other complaints such as pain, fever, or symptoms suggestive of urinary tract infection. She was referred for an ultrasound examination which revealed a bicornuate uterus with separate cervixes (bicornis bicollis uterus), and an anechoic collection or cyst in the vagina. There was no evidence of hydrometra or hydrosalpinx. The right kidney was not visualized. Left kidney showed normal morphology (Figures 1-4).

On examination under anesthesia, the cyst revealed to be obstructed hemivagina filled with clear fluid. It was drained, and the septum excised. Further examination showed two cervixes suggestive of uterus didelphys (Figures 5 and 6).

DISCUSSION

Herlyn–Werner–Wunderlich syndrome comprises of obstructed hemivagina and ipsilateral renal agenesis and

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Figure 1: Sagittal image showing empty right renal fossa. Compare with normal left kidney



Figure 4: Axial section at level of cervix showing two cervixes



Figure 2: Sagittal image showing fluid or cyst in vagina



Figure 5: Bluish cystic swelling at introitus



Figure 3: Axial section at level of fundus showing bicornuate uterus



Figure 6: Obstructed hemivagina and patent hemivagina under anesthesia

was first reported in 1922. It is more recently known by the acronym OHVIRA and commonly associated with uterine didelphys or rarely septate uterus.⁶ The incidence

of OHVIRA syndrome is very rare, and only isolated case reports have been published.⁴

Female reproductive tract develops both from paramesonephric and mesonephric ducts.

The OHVIRA syndrome occurs due to the developmental arrest of ipsilateral Wolffian duct resulting in developmental failure of distal hemivagina leading to obstructed hemivagina. The uterine didelphys commonly associated with OHVIRA syndrome occurs due to failure in the fusion of paired Mullerian ducts.⁴ The female genital and urinary tracts have a similar embryological origin from the intermediate mesoderm, which is responsible for the increased association of their anomalies. Ipsilateral renal agenesis is a common urologic anomaly seen in OHVIRA syndrome.^{7,8}

Typically, a patient with this rare condition presents after menarche with non-specific symptoms of recurrent pelvic pain with vaginal or pelvic mass. However in our case the patient presented at a very early age, which is very rare.⁹ The pelvic examination may show a bulging vaginal mass, but sometimes the mass may be small and difficult to determine.¹⁰ In general, ultrasonography is the initial screening tool in cases of suspected female genital tract anomalies. However, magnetic resonance imaging (MRI) is the most accurate diagnostic method as it better depicts uterine anatomy and has excellent tissue characterization, which play a crucial role in surgical planning.¹¹ In our case, however, ultrasonography alone was reliable in diagnosing this rare anomaly with proper delineation of uterine contour. The sonographic findings were clinically and peroperatively corroborated.

Mullerian agenesis and renal agenesis often coexist in Herlyn syndrome, so it is important to look for urinary tract anomalies in all cases of Mullerian duct anomalies.¹² Genitourinary anomalies can be associated with other abnormalities such as an atrial septal defect, coarctation of aorta, and spinal anomalies. Hence, a complete physical examination and relevant investigations are necessary in all patients.¹³ Ipsilateral renal agenesis is found in 81% cases of OHVIRA syndrome and 25-50% show genital anomalies.¹⁴

The classic treatment is resection of the vaginal septum to relieve the obstructed hemivagina. Hemihysterectomy is no longer preferred, as the reported incidence of pregnancy is similar with hemihysterectomy and transvaginal repair. A successful pregnancy occurs in 87% of the patients with OHVIRA syndrome.^{10,12,13,15}

CONCLUSION

OHVIRA syndrome is an uncommon congenital anomaly with clinical significance and simple surgical management. Imaging, particularly MRI plays an important role in diagnosis. However, an initial screening ultrasound can sometimes diagnose it as in our case. An early correct diagnosis is a goal to relieve the symptoms and prevent complications caused by retrograde menstruation resulting in endometriosis and in preserving sexual and conceptional abilities.

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Horseshoe Kidney with Bilateral Ureteropelvic Junction Obstruction with Multiple Renal Calculi: A Case Report

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Abstract

Horseshoe kidney is the commonest fusion anomaly of the genitourinary tract with a prevalence of 1/400-1/800. It is characterized by renal malrotation, variable blood supply, high insertion of the ureter, and a propensity to form an ureteropelvic junction (UPJ) obstruction in up to one-third of cases. The most common complication of horseshoe kidney is kidney calculus. The management of a young patient who presented with horseshoe kidney with recurrent multiple renal calculi due to bilateral UPJ obstruction with recurrent urinary tract infection is described. During follow-up after 3 months, the patient was symptomatically relieved, there were no complaints of pain or fullness in the abdomen and the patient has started doing daily regular activities and work.

Key words: Horseshoe kidney, Percutaneous nephrolithotomy, Pyeloplasty, Ureteropelvic junction obstruction, Urolithiasis

INTRODUCTION

Horseshoe kidney is the commonest fusion anomaly of the genitourinary tract with a prevalence of 1/400-1/800.¹ It is characterized by renal malrotation, variable blood supply, and a propensity to form ureteropelvic junction (UPJ) obstruction in up to one-third of cases.² UPJ obstruction is postulated to develop secondary to congenital stricture, high ureteral insertion, an abnormal ureteral course over the isthmus, crossing vessels supplying the isthmus, or abnormal motility of the UPJ segment.³

The most common complication of horseshoe kidney is kidney calculus. It was previously believed that such a high frequency of calculus formation in these patients was due to the higher rate of infection, stasis, and obstruction. However, the last reviews are suggestive for metabolic causes in most of the patients.⁴

The management of a young patient who presented with horseshoe kidney with recurrent multiple renal calculi due to bilateral pediatric ureteropelvic junction (PUJ) obstruction is described.

CASE REPORT

A 24-year-old male patient presented with complaints of intermittency, burning micturation, pain lower abdomen, fullness in both flanks, increased frequency of micturation, and dysuria off and on for 3 years. The patient gave a history of left-sided open pyelolithotomy 3 years back. The operation was uneventful, but there was no total stone clearance. The patient was evaluated and investigated. Complete blood count, liver function tests, and renal function test were normal. Urine routine microscopy was showing signs of infection. Ultrasound (USG) abdomen showed the findings suggestive of horseshoe kidney with bilateral multiple renal calculi with gross hydronephrosis. Intravenous pyelogram (Figure 1) was suggestive of multiple bilateral renal calculi with bilateral hydronephrosis with horseshoe kidney. Nuclear renogram (Figure 2) was showing horseshoe kidney with bilateral impaired parenchymal function and obstructed drainage pattern on the left side and sluggish partially obstructed drainage pattern on the right side.

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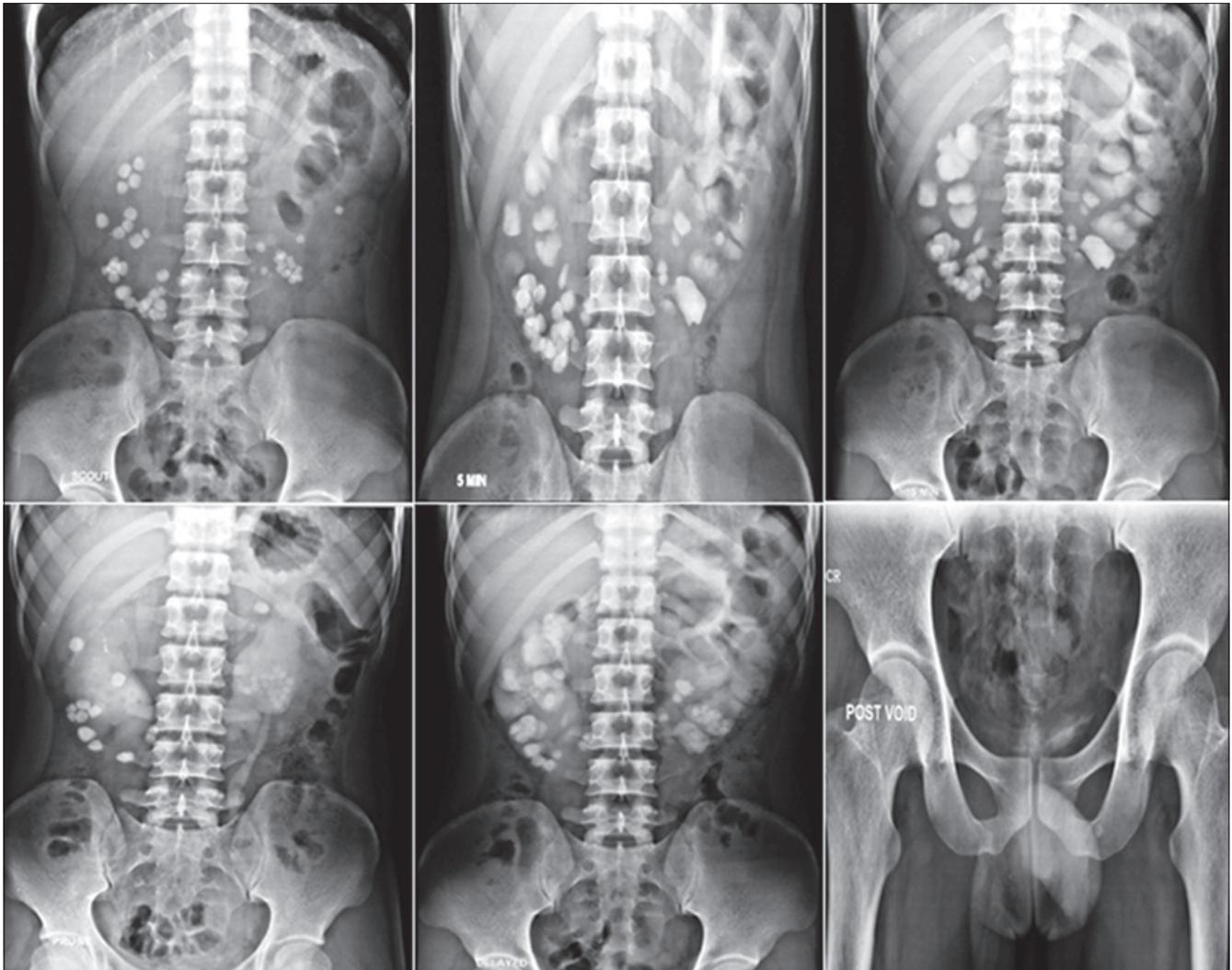


Figure 1: Intravenous pyelogram suggestive of multiple bilateral renal calculi with bilateral hydronephrosis with horseshoe kidney

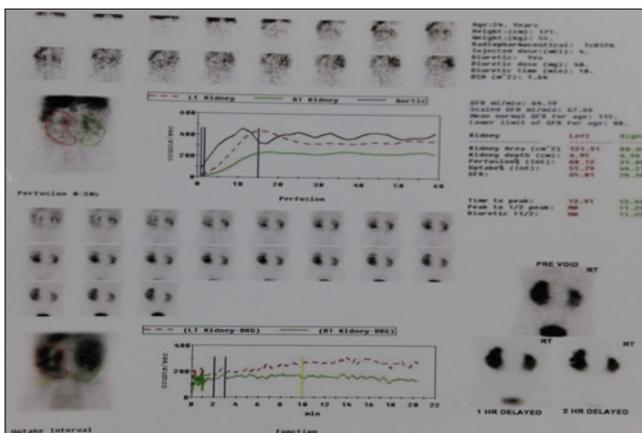


Figure 2: Nuclear renogram showing horseshoe kidney with bilateral impaired parenchymal function and obstructed drainage pattern on the left side and sluggish partially obstructed drainage pattern on the right side. Differential renal function of left moiety - 55.79% and right moiety - 44.21%

The patient was subjected to bilateral retrograde pyelogram which showed bilateral UPJ obstruction with high insertion of the ureter. Bilateral open pyelolithotomy with pyeloplasty with double-J (DJ) stenting was done through a lower midline incision. Post-operative hospital stay was uneventful. Follow-up USG and X-ray kidneys-ureters-bladder (KUB) after 2 weeks showed residual calculi, 4 on right and 3 on the left side. Urine culture was positive for *Escherichia coli* $>10^5$ which was managed conservatively with injectable cefotaxime for 7 days. X-ray KUB 3 weeks later showed right renal calculi with left lower ureteric calculi. The right side percutaneous nephrolithotomy (PCNL) with left sided ureterorenoscopy lithotripsy (URSL) was done, complete stone clearance (Figure 3) was achieved and bilateral DJ stenting was done. During follow-up, the patient was symptomatically relieved; there were no complaints of pain or fullness in the abdomen.



Figure 3: Post-operative X-ray kidneys-ureters-bladder showing complete stone clearance

DISCUSSION

Horseshoe kidney is the result of a developmental defect occurring between 4th and 8th weeks of embryogenesis. As the kidney develops, the inferior poles fuse and its ascent is arrested by the inferior mesenteric artery. The kidneys are fused by an isthmus, which can be a band of fibrous tissue or a thick rim of functional renal tissue. Clinical findings are those of infection, calculi, obstruction or tumor due to anomalous position of pelvis, and ureters. As the most common complication of the horseshoe kidney necessitating surgical intervention, urolithiasis has an incidence of 20-60%, and UPJ obstruction occurs at an incidence of 15-33%.⁵

The primary technical challenges of pyeloplasty in this population relate to aberrant lower pole vessels, the unfamiliar caudal position of the kidney, and renal isthmus. Conventionally, the management of UPJ obstruction in horseshoe kidney has been open dismembered pyeloplasty with isthmusectomy and nephropexy of the ipsilateral kidney.³ Simple Anderson–Hynes pyeloplasty via a flank incision without additional division of the isthmus and lateropexy of the kidney is also a highly effective and safe procedure for treating UPJ obstruction in horseshoe kidney.⁶

The calculi in a horseshoe and ectopic kidneys present unique challenges in decision-making and technical

aspects of treatment. PCNL has been shown to be highly successful with an overall stone-free rate of 75-100% in a few series.⁷

In the case of this patient who presented with horseshoe kidney with recurrent multiple renal calculi due to bilateral UPJ obstruction with recurrent UTI. The patient was managed successfully with bilateral open pyelolithotomy with pyeloplasty in a single setting. The patient developed UTI during follow-up period, which related to bilateral DJ stent *in situ*, and managed conservatively with antibiotics. In view of residual calculi, the right PCNL and left URSL was done, and complete stone clearance was achieved. After 3 weeks, bilateral DJ stent was removed. During follow-up after 3 months, the patient was symptomatically relieved, there were no complaints of pain or fullness in the abdomen and the patient has started doing daily regular activities and work.

CONCLUSION

There should be a high index of suspicion for UPJ obstruction in a patient presenting with horseshoe kidney with recurrent multiple renal calculi. Its management requires multimodal approach with the judicious use of endoscopic and open surgical intervention. Correction of UPJ obstruction is recommended to treat the symptoms and prevent the recurrence of calculi in these patients.

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Failed Deep Anterior Lamellar Keratoplasty in Avellino Stromal Dystrophy: A Case Report and Review of Literature

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Abstract

Corneal dystrophy (CD) has an autosomal dominant inheritance pattern. A female 45 years of age presented with both eyes dimension of vision in the recent past without any associated ocular pathology. Examination revealed an Avellino's stromal CD. Multiple white dots about 0.5 mm in diameter, studding the stroma not involving the endothelium, spread over central 8 mm with an interdigitating network of filaments. Deep anterior lamellar keratoplasty (DALK) on the table showed the filaments were anchored to the endothelium not allowing a separation though anterior segment optical coherence tomography and histopathology showed they are neatly separated from it. We are publishing this case to highlight the need for a good corneal endothelial count in the donor cornea and the need to keep the option of penetrating keratoplasty in a Avellino stromal dystrophy though DALK is the first choice of management.

Key words: Avellino dystrophy, Corneal dystrophy, Deep anterior lamellar keratoplasty, Keratoplasty

INTRODUCTION

Corneal dystrophy (CD) is defined as bilateral and symmetric primary corneal disease, without previous associated ocular inflammation. Most cases of CD have an autosomal dominant inheritance pattern, starting at the first decades of life, with a stable or slowly progressive course. CDs are classified according to the involved corneal layer (Table 1).

Avellino CD was first described by Folberg *et al.* (1988). It exhibits features of both granular and lattice dystrophy. It is inherited in an autosomal dominant fashion and related to the transforming growth factor beta-induced gene (TGF β 1), locus 5q31.¹ Biomicroscopically, granular deposits are more superficial and as the disease progresses, a snowflake appearance deeper in the stroma can be noted. The linear refractile deposits tend to be deeper than the

granular deposits, but with progression these lines coalesce with the round opacities.² First signs of the disease can be seen as early as 3 years of age in homozygotic cases, but most common during puberty or early adulthood.³ Visual acuity deteriorates as the central visual axis becomes affected, and corneal erosions can result in episodes of pain. Homozygotes can have a more rapid course comparing with heterozygotes patients. Visual rehabilitation is achieved by corneal transplantation usually lamellar.

CASE REPORT

Female 45 years old presented with complaints of gradual progressive diminution of vision since 10 years of age. She was unable to do her routine activities in the past 3-4 months necessitating a visit to the eye doctor. There was no contributory history in the form of trauma, inflammation, or any surgical procedure in the past. The patient did not have any systemic illness negating any metabolic disorders. Family members did not have any similar visual problem.

On examination, the ocular findings in both eyes were similar. Best corrected visual acuity 6/60 due to opacity

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Table 1: Type of CD

CD categorized by corneal layer
Epithelial and subepithelial dystrophies
EBMD
ERED
SMCD
Meesmann's CD
Lisch epithelial CD
Gelatinous drop-like CD
Bowman's layer dystrophies
Reis-Bucklers' CD
Thiel-Benke CD
Grayson-Wilbrandt CD
Stromal dystrophies
Lattice (Type I, II, III, and IV)
Granular (Groenouw type, Avellino dystrophy)
Macular (Type I and II)
SCCD
Congenital stromal CD
Fleck's CD
Posterior amorphous CD
Central cloudy dystrophy of Francois
Pre-Descemet's CD
Descemet and endothelial dystrophies
Fuch's endothelial CD (early onset and late onset)
Posterior polymorphous dystrophy
Congenital hereditary endothelial dystrophy
X-linked endothelial dystrophy

CD: Corneal dystrophy, EBMD: Epithelial basement membrane dystrophy, ERED: Epithelial recurrent erosion dystrophy, SMCD: Subepithelial mucinous corneal dystrophy, SCCD: Schnyder's corneal crystalline dystrophy

involving the optical axis. Ocular adnexa, conjunctiva, and sclera were normal. The cornea was normal in size and shape. Multiple white dots about 0.5 mm in diameter eroding out of the epithelium, studding the stroma not involving the endothelium, spread over 8 mm area, with the interdigitating network of filaments. No vascularization, pigmentation, or degeneration (Figures 1 and 2). The corneal sensations were present. The rest of anterior segment and posterior segment were within normal limit (Table 2).

To support our clinical finding, we ordered anterior segment optical coherence tomography of both eyes. There was deep stromal involvement sparing the descemet's membrane (DM) and the endothelium (Figure 3). For visual rehabilitation, a decision to do deep anterior lamellar keratoplasty (DALK) was taken as the stromal involvement spared the descemet's and the endothelium. Routine investigation for anesthesia fitness was taken and tissue arranged with a good endothelial count of 2450 cells/cumm. This was done in contingency to an inadvertent conversion to penetrating keratoplasty (PKP). On the table, Big bubble technique was done after lamellar dissection of 300 μ of the central 8 mm of the corneal tissue. A central cruciate incision over the central cornea over an iris repository was done to prevent an inadvertent corneal perforation. During the lamellar dissection to

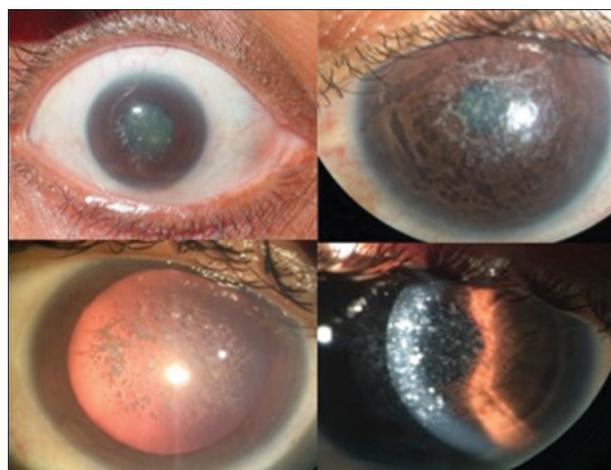


Figure 1: Right eye stromal corneal dystrophy external and slitlamp view

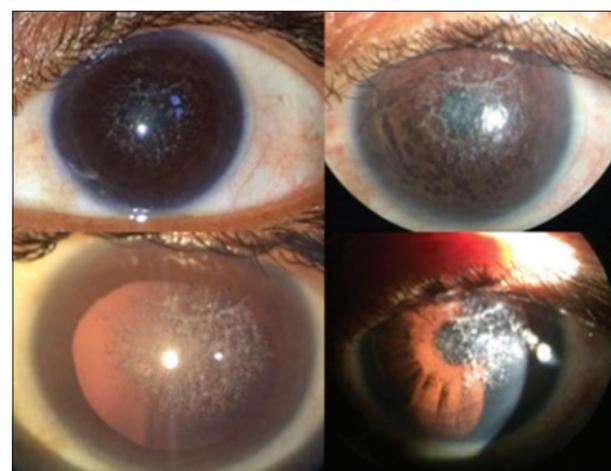


Figure 2: Left eye stromal corneal dystrophy external and slitlamp view

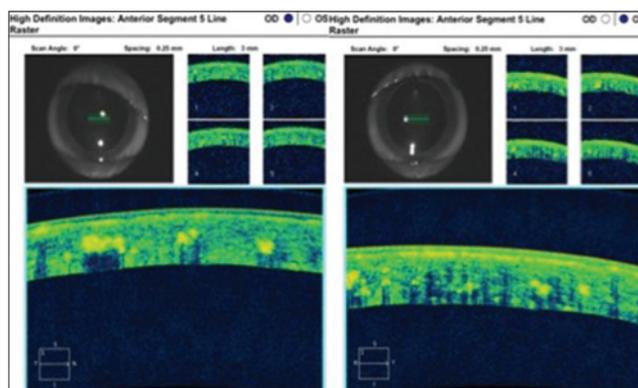


Figure 3: BE anterior segment optical coherence tomography showing stromal corneal dystrophy

the periphery, it was noticed that the filaments in the stroma were deeply embedded into the descemet's and the endothelium making it difficult to find the plane between the stroma and descemet's. The descemet's

Table 2: Ocular findings in both eyes

Ocular Examination	Right eye	Left eye
BCVA	6/36	6/60
Retinoscopy	+1.25±1.25	+1.0±1.0
Ocular adnexa	Normal	
Cornea	Normal size shape. Multiple white dots about 0.5 mm in diameter eroding out of the epithelium, studding the stroma not involving the endothelium, spread over 8 mm area, with interdigitating network of filaments. No vascularization, pigmentation or degeneration. Corneal sensation WNL.	
Anterior chamber	Normal in depth. No KPs, flares, and cells	
Iris/pupil	CPN/CCRTL	CPN/CCRTL
Lens	No evidence of cataract	
EOM	Free and full	Free and full
Dil. fundus examination	Media: Clear Disc: 0.3 C/D ratio, with normal neuroretinal rim Vessels normal A V ratio; Macula: Normal FR: +	
Gonioscopy	Open angles in both eyes	
IOP on applanation	17 mm of Hg	16 mm of Hg

IOP: Intraocular pressure, BCVA: Best corrected visual acuity, KP: Keratic precipitates

and the endothelial residual layer were cut with corneal scissor and donor graft full thickness was replaced on the recipient 8 mm corneal defect bed. It is thus mandatory not to separate the anterior and posterior lamellae before the recipient dissection is completed (Figure 4). On table decision to convert to PKP was taken as dissection was not possible. 2450 cells/cumm would prognosticate a good success rate of this PKP (Figure 5). It thus becomes mandatory to have a good endothelial count in case of doing a DALK just to prevent a disaster in case of conversion to PKP. Histopathological (HP) examination of the excised corneal tissue showed hyaline degeneration of collagen and fusiform shaped amyloid deposits confirming a dual granular and lattice stromal dystrophy pointing toward Avellinos' CD (Figure 6).

DISCUSSION

Corneal stromal dystrophies are grossly classified into a lattice, granular and macular depending on the age of presentation, vision deprivation, and clinical characteristics. You may have isolated presentation or combination of any two (Table 3). In our patient, we had features of granular as well as lattice confirming Avellino CD.⁴ For close to 100 years, this entity was considered a mild variety of granular CD (Groenouw Type I). Bucklers, as early as 1938, described a large family with illustrative pictures of this phenotype. 50 years later, Weidle published the same patients and subdivided granular dystrophy according to



Figure 4: Left eye intra operative conversion of deep anterior lamellar keratoplasty to penetrating keratoplasty due to inability to separate the layers



Figure 5: Left eye post-operative clear graft



Figure 6: Histopathology showing granular deposit extremely close indenting the endothelium

subtle differences of clinical appearance. In 1988, Folberg *et al.* described the histopathology of deposition of both amyloid and hyaline deposits in these patients. In 1992, the clinical findings of these patients were published. Avellino, which is the Italian district of the progenitor of the pedigree, became the popular name.^{1,3} It is an autosomal dominant disease. Mutation of TGFβ1, or keratoepithelin

Table 3: Types of corneal stromal dystrophy and its characteristics

Characteristics	Lattice	Granular	Macular
Genetics	Autosomal dominant	Autosomal dominant	Autosomal recessive
Onset	1 st decade of life	Early adolescence	1 st decade
Vision	Early reduction with obvious clouding	Good until middle age	Reduced by 30-40 years, FC by 50 years
Symptoms	Severe recurrent erosions	Minimal inflammation and irritation	Mild recurrent erosions
Opacities	Grayish "pipe cleaner" linear, branching, threads; dots and flakes; distinct borders	Grayish opaque granules; bread crumbs; sharp borders	Grayish opaque spots; indistinct borders
Intervening stroma	Relatively clear	Clear	Diffusely clear
Distribution of Opacities	Entire cornea with dots; linear opacities central; periphery usually clear; Progress to central disciform by middle age	Axial only; periphery clear	Entire cornea; but most dense centrally
Histopathology	Large hyaline lesions with scattered fibrillar material; also subepithelial	Discrete, hyaline, granulated	Diffuse, granular, nonhyaline, Asso with keratocytes
Defect	Structural protein: Primary amyloidosis of cornea	Structural proteins: Hyaline degeneration of collagen	Metabolic: Defective acid mucopolysaccharide metabolism

gene in human chromosome 5 (5q31) is the key pathogenic process. Corneal trauma activates TGF β 1 and then it overproduces TGF β 1p, which is the main component of the corneal opacity (Table 4).

Homozygous patients have an earlier onset of presentation, as early as 3 years of age, compared with heterozygote patients, which may be diagnosed by 10 years.⁵ Initial slit lamp signs are subtle superficial stromal tiny whitish dots. In the next stage, rings or stellate-shaped snowflake stromal opacities appear between the superficial stroma and the mid stroma, also demonstrate lattice lines in the deeper cornea.⁶ Typically, these lines are located deeper than the snowflake stromal opacity. In the final stage, there is a more superficial, translucent flattened breadcrumb opacity, which may coalesce in the anterior stroma. Some patients only manifest multiple white dots with persistent epithelial erosions. By adulthood, there are larger, very dense subepithelial irregularly shaped opacities, which may become deeper with time. Vision decreases with age as the central visual axis becomes affected. Pain may accompany mild corneal erosions. It is slowly progressive though homozygotes demonstrate more rapid progression. On HP exam, corneal opacities extend from the basal epithelium to the deep stroma and individual opacities stain positive with H&E, Masson trichrome, or Congo red.² Mixed deposits of hyaline and amyloid; hyaline stains with Masson Trichrome and amyloid stains with Congo red³ (Table 5). Initial management options include lubricating drops, or autologous serum therapy, punctal plugs, bandage contact lenses \pm antibiotics for recurrent erosions. Surgical management options are phototherapeutic keratectomy, lamellar keratoplasty, DALK, and PKP. However, the recurrence is still an unsolved problem. DALK has been proposed as an excellent alternative to PKP for corneal diseases that do not affect the endothelium. In patients with epithelial and stromal CD and keratoconus, DALK

Table 4: TGF β 1 and CD

TGF β 1 (gene product of TGF β 1) is very abundant in cornea
 >30 mutations in TGF β 1 gene that result in corneal dystrophies
 68 kDa protein known as keratoepithelin
 It is secreted by corneal epithelial cells and is found in normal stroma bound to type VI collagen \Rightarrow Mutations in the TGF β 1 gene protein aggregation in the cornea
 2/2 protein misfolding
 TGF β 1 induced protein accumulates as insoluble products in various forms.

The severity, clinicopathologic variations, age of onset, and location of deposits all depend in the type of amino acid alterations in the protein

CD: Corneal dystrophy, TGF β 1: Transforming growth factor beta-induced gene

Table 5: Staining pattern

Staines	Lattice	Granular	Macular	Avellino
PAS	+		+	+
Trichrome masson	+	+		+
Congo red (under polarization)	+			+
Alcian blue			+	

PAS: Periodic acid schiff

preserves native endothelium and reduces host immune system reaction and graft rejection. Current surgical techniques of DALK involve manual dissection up to near DM or injection of air, fluid, or viscoelastic into deep stroma to create a plane of separation between DM and stromal tissue.⁷ Malbrans stromal "peeling technique" technique allows dissection of deep corneal stroma in a safe and effective manner even in cases of advanced keratoconus. Intrastromal air injection to aid stromal resection was first described by Archila in 1985. Price and Chau described "air lamellar keratoplasty" using similar technique with deeper dissection and lyophilized full thickness donor tissue for replacement.⁸ Sugita and Kondo described technique of hydro-delamination of posterior stromal fibers with an injection of saline using 27-gauge cannula, which was performed after the removal of anterior

three quarters depth of recipient tissue.^{8,9} The DM was exposed in the central 5 mm zone prior to the placement of full thickness donor tissue. A similar technique using viscoelastic instead of saline, i.e., “visco-delamination” was described by Morris *et al.*, Melles described a technique of planned depth lamellar dissection in DALK. This involves injection of air into the anterior chamber following which an incision is made in the peripheral corneal stroma, observing the reflex of the sharp tip against the convex mirror from air endothelium interface. Anwar and Teichmann described the “big bubble” technique, wherein air injection was performed into the deep stromal tissue to achieve separation of DM from the corneal stroma. Manual DALK techniques have been described which allow deep dissection down to near DM levels.¹⁰ These are useful in cases where in big bubble is not achieved following air injection, or there is scarring process involving the DM for which air injection is contraindicated.¹⁰

Major indications for conversion of DALK to PKP include macroperforations and extensive DM deposition. The rate of conversion from DALK to PKP was about 2.96%. Other studies have reported 0-14% conversion rate.⁸ A study by Unal *et al.* in 2013 had 94.6% cases of stromal dystrophy successfully treated with DALK out of which 35.3% had a recurrence.

CONCLUSION/SUMMARY

An attempt was made to perform a DALK in this case primarily for its benefits of early rehabilitation and reduced chances of graft rejection. No disruption of the

anterior chamber refuting peripheral anterior synechiae and secondary glaucoma. Reduced number of sutures, even 8 or 12 is adequate preventing vascularization and infiltration. Sutures can be done away if tissue glue with placement sutures are used. However, the fibrillar strands binding the posterior stroma to descemet and endothelium in optical axis make it mandatory to do a PKP for better visual recovery inspite of enhanced risk of rejection.

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Traumatic Diaphragmatic Hernia: A Case Report

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Abstract

A traumatic diaphragmatic hernia is caused as a result from blunt or penetrating trauma and occurs in about 5% of cases of severe blunt trauma to the trunk. Early diagnosis of traumatic diaphragmatic hernia is necessary to decrease morbidity and mortality associated with it. This case report describes the case of 18-year-old male who had an accidental fall from the tree and had a diagnosis of traumatic diaphragmatic hernia. On physical examination, upper abdomen is tender left hypochondrium is tender breath sounds over left half of chest are not heard, and bowel sounds are heard. Thoracoabdominal X-rays and computerized tomographic imaging have demonstrated multiple gas shadows in the left side of thorax with collapse of the left lung. Laparotomy and exploration revealed a diaphragmatic tear of size 15 cm with herniation of stomach, transverse colon, spleen, and omentum.

Key words: Diagnosis, Diaphragm, Hernia, Trauma

INTRODUCTION

Diaphragmatic rupture occurs due to blunt or penetrating injury, which would be either as an acute presentation or delayed as respiratory distress or obstruction.¹ The course of events following disruption varies highly.² This overshadowing injury to the bony skeleton, lungs, central nervous system, or abdominal viscera may obscure a diaphragmatic problem in the immediate post-traumatic period.³ The manifestation of diaphragmatic injury that represents first is delayed occurrence of visceral strangulation. The most serious complication of a diaphragmatic hernia is strangulation, and the occurrence of symptoms of intestinal obstruction or pulmonary compression in a patient with a recent or old wound of the chest or upper abdomen should arouse suspicion. Inadequacy of surgical diagnosis and management may be due in part to the relative infrequency of diaphragmatic rupture. However, early recognition and prompt surgical treatment appears to be within the capability of surgeons.⁴

It can be managed through a laparotomy or a thoracotomy³ and in the current scenario with minimal access surgery.

CASE REPORT

The 18-year-old male presented to the emergency room (ER) with complaints of dyspnoea at rest, orthopnoea and pain in the left upper abdomen due to fall from tree and blunt trauma to the abdomen. Examination revealed the presence of bowel sounds over the left thorax and normal bowel sounds in the abdomen and decreased breath sounds on left hemi thorax.

A plain X-ray taken in the ER showed bowel loop shadows in the chest (Figure 1a and b).

The patient was then stabilized in ER and later shifted for a computed tomography (CT) of thorax and abdomen which showed herniation of the bowel loops through the left hemi diaphragm. Mediastinal shift to the right and there was little lung field visualized on the left chest was observed. Diagnosis of diaphragmatic hernia was made.

After stabilization, patient was shifted to operation theatre with high-risk consent. Exploratory laparotomy revealed a diaphragmatic tear of size 15 cm × 12 cm with herniation of stomach, transverse colon, spleen, and omentum into the thoracic cavity. Contents (Figure 2a-c) are reduced,

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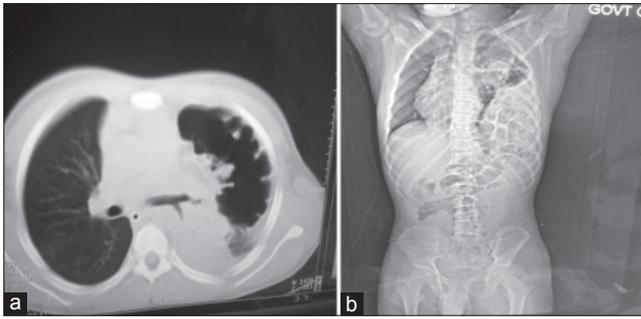


Figure 1: (a and b) Computerised tomographic chest showing bowel gas shadows in left hemithorax

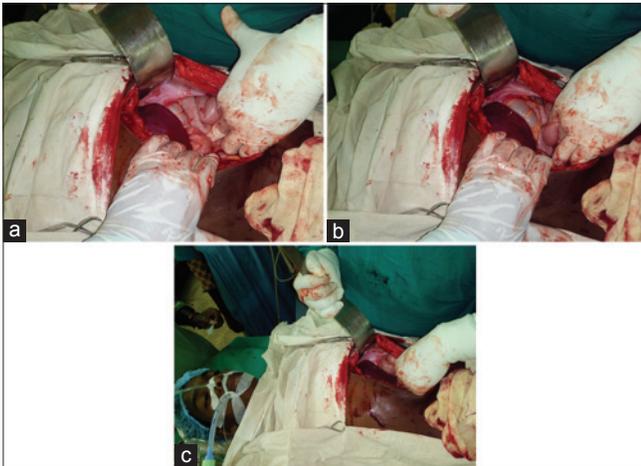


Figure 2: (a-c) Intraoperative pictures showing the defect and contents

and defect is closed with proline mesh. Lung tissue was compressed that did not expand even after reduction of a hernia. Then, a left thoracic drain was placed, and abdomen is closed after ensuring the rest of abdomen was normal.

DISCUSSION

Incidence

Diaphragmatic injury accounts for about 0.8-1.6% of blunt trauma abdomen. Nearly about 4-6% of patients who undergo surgery for trauma have a diaphragmatic injury.²

Etiology

The major cause of diaphragmatic injury is either by penetrating or blunt injuries to the abdomen. They are mostly diagnosed as part of multi-organ injury, or later either with respiratory distress or as intestinal obstruction.⁵ Shearing of a stretched membrane, the sudden force transmission through viscera acting as viscous fluid and avulsion at the point of diaphragmatic attachment is considered as possible mechanism in blunt injury. The most common injuries occur on left side, of about 68.5% of the patients and right side injuries accounts for 24.2%, and 1.5%

had bilateral rupture, 0.9% had pericardial rupture, and 4.9% were unclassified in the present collective review.⁶ Many autopsy studies have revealed that incidence of rupture is almost equal on bilateral sides, but the greater force needed for the right rupture is associated with more grave injuries. A positive pressure gradient of 7-20 cm of H₂O between the intraperitoneal and the intrapleural cavities forces the contents into the thorax. With severe blunt trauma, the pressures may rise to as high as 100 cm of water.⁷⁻⁸

Clinical Features

The patient with a diaphragmatic rupture often presents to surgeon with symptoms of breathlessness, which is been mistaken as bronchopneumonia. Abdominal signs due to obstruction may be another mode of presentation. The grading of severity has been proposed by Grimes who discussed diaphragmatic rupture in phases- acute, latent and the obstructive phase.⁷

The acute presentation is in the patient with poly trauma associated with multiple intra-abdominal and chest injuries. The latent phase is when herniation occurs through undetected diaphragmatic ruptures and rents. The obstructive phase is when the loop of herniated bowel obstructs, and the patient develops distension and strangulation.⁹

Investigations

An X-ray is diagnostic when the nasogastric tube is seen in the chest. The collar sign is seen when abdominal contents are seen in the thorax with or without focal constriction. Elevation and distortion of the hemi diaphragm are corroborative signs. A CT thorax has a sensitivity of 14-82% and a specificity of 87% and permits direct visualization of the contents and the rupture. Focussed abdominal sonography for trauma is now a good aid in diagnosing diaphragmatic hernia.

Management

When a diagnosis of diaphragmatic rupture is suspected in a patient with poly trauma, military anti-shock trousers are contra-indicated as it could cause severe cardiopulmonary deterioration. The patient is stabilized and taken up for emergent surgery. While controversies exist between laparotomy and thoracotomy-laparotomy is preferred as this is often associated with other abdominal injuries.¹⁰ In the series of 15 patients who underwent initial thoracotomy, 7 required laparotomy for associated injuries as against one in 65 that required thoracotomy after laparotomy. Minimally invasive procedures (abdominal and thoracic) are now-a-days preferred in small defects detected early. Laparotomy remains the gold standard in large defects. While simple suture is sufficient in the former, larger defects need a synthetic mesh.¹¹⁻¹²

CONCLUSION

Knowledge of diaphragmatic hernia is essential for both the physician and the surgeon in atypical abdominal and respiratory discomfort, especially when there is history of trauma. This hernia is amenable to correction by minimal access surgery and requires a prompt diagnosis aided by a high index of suspicion.

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Inflammatory Myofibroblastic Tumor of Central Nervous System: A Case Report

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Abstract

Since many year there has been a debate regarding the disease entity of inflammatory myofibroblastic tumor (IMT) in the central nervous system (IMT-CNS) because of its rarity and high frequency of recurrence. IMT-CNS is an important differential diagnosis among tumor-like intracranial lesions, and total resection is required. A 4-year-old female presented with a rare inflammatory myofibroblastic tumor (IMT) manifesting as a recurrent headache, vomiting, and one episode of GTCS. Computed tomography Scan Brain and contrast revealed an isointense extra-axial lesion involving the left parieto-occipital region with intense homogenous contrast enhancement. The tumor was grayish-white, firm to hard moderately vascular and was resected en bloc with a clear margin. Histological examination revealed multiple spindle cells with plasma cells and lymphocytes scattered among these spindle cells. The spindle cells were diffusely immunopositive for vimentin and negative for smooth muscle actin, epithelial membrane antigen, S100 negative, and CD34 negative so a diagnosis of benign spindle cell lesion inflammatory myofibroblastic tumor was rendered.

Key words: Central nervous system, Inflammation, Tumor

INTRODUCTION

Inflammatory myofibroblastic tumor (IMT) is a rare lesion consisting of myofibroblastic spindle cells and inflammatory cells that occurs primarily in soft tissue and the viscera of children and young adults.^{1,2} IMT has been described under many different names, such as inflammatory pseudotumor and plasma cell granuloma. It usually follows a benign clinical course and is most common seen in the lung, omentum, and mesentery. Diagnosis depends on histological examination because the radiological and clinical findings are non-specific. IMT is a rare disease with unknown etiology characterized by non-neoplastic polyclonal proliferation of mature plasma cells and other mononuclear cells. IMT in the central nervous tends to arise from meningeal structures. The disease

entity has a high frequency of recurrence and malignant transformation compared with IMT not affecting the central nervous system (CNS).³

Here, we describe a case of cerebral intraparenchymatous IMT in an adult, which seemed to exhibit the benign and inflammatory characteristics of IMT-CNS or inflammatory pseudotumor.

CASE REPORT

The 4-year-old female was admitted to our emergency department with one episode of generalized tonic-clonic seizures. She was also suffering from recurrent headaches and occasional vomiting for the past 3 months. Neurological examination revealed GCS of 14/15 and right hemiparesis MRC grade 4/5. Fundus examination revealed bilateral papilledema. Results of blood examination were normal. Computed tomography scan brain (Figure 1) revealed an isointense extra-axial lesion involving the left parieto-occipital region with intense homogenous contrast enhancement, causing squashing of ipsilateral ventricle and hydrocephalus. Grossly, it was grayish-white, firm to hard moderately vascular, and arising from left anterior petrous

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dura mater (Figure 2). Morphological appearance was like meningioma. The lesion was resected en bloc.

Histopathology revealed multiple spindle cells in patternless arrangement with plasma cells and lymphocytes scattered among these spindle cells. There was no pleomorphism, mitoses or necrosis. The spindle cells were diffusely immunopositive for vimentin and negative for smooth muscle actin, epithelial membrane antigen, S100 negative, and CD34 negative so a diagnosis of benign spindle cell lesion IMT was rendered.

DISCUSSION

IMT is a rare tumor that can exceptionally be found in the CNS. IMT is a distinctive myofibroblastic spindle cell lesion accompanied by an inflammatory infiltrate of plasma cells, lymphocytes, and eosinophils.⁴ Three subtypes have been

described: (1) Compact spindle cells with inflammatory cells, (2) inflammatory areas resembling nodular fasciitis, and (3) dense plate-like collagen resembling scar.

IMT-CNS is rare, with only approximately 100 reported cases.³ IMTs of the CNS can be classified into two histopathological types: A form rich in spindle myofibroblasts mixed with few inflammatory cells, also called the FHC variant, and the PCG-like type composed mainly of plasma cells and lymphocytic infiltration. Recent case series proposed that the two types are different in terms of tumor aggressiveness. Localization of IMT can be divided into 5 types: Intraparenchymatous, meningeal, mixed intraparenchymatous and meningeal, intraventricular, and extending to the cranial cavity/sphenoid sinus.³ The etiology of IMT-CNS is unknown, but 60% of IMT-CNS tumors have arisen from the dural/meningeal structures and only 12% from intraparenchymatous lesions.³ The present case had attachment to dural/meningeal structures, and was classified as the meningeal type.

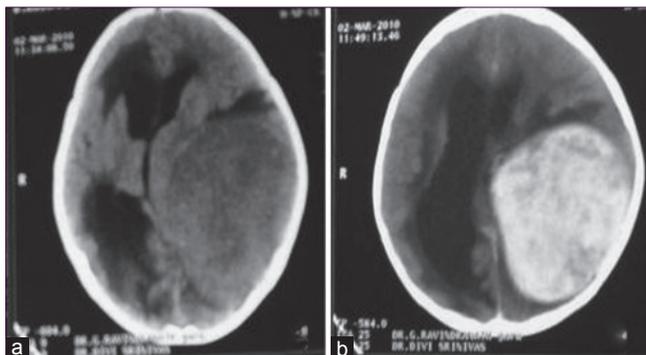


Figure 1: (a and b) Computed tomography scan brain showing an isointense extra-axial lesion involving the left parieto-occipital region with intense homogenous contrast enhancement, causing effacement of ipsilateral ventricle and hydrocephalus

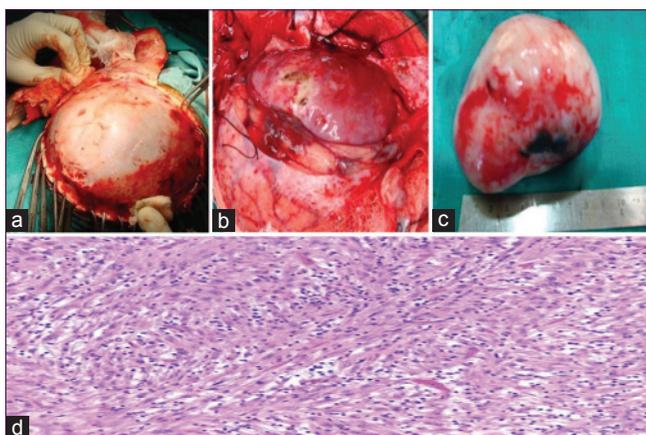


Figure 2: (a-d) Grayish-white, firm to hard moderately vascular tumor. Furthermore, seen in the histopathological picture (d) multiple spindle cells in patternless arrangement with plasma cells and lymphocytes scattered among these spindle cells without any pleomorphism or necrosis

The neuroimaging findings and clinical course of IMT-CNS are non-specific, such that differential diagnosis is important in the case of meningeal lesions, especially with meningioma or sarcoma.⁵ Earlier cases likely included an indiscriminate mixture of neoplastic and non-neoplastic process. Of patients with extrapulmonary IMT, 15% had one or more recurrences over a period of 1-24 months (mean 6 months),¹ but patients with IMT-CNS had recurrence rate after incomplete resection of 40% within 2 years.³ Two of the three young patients with IMT-CNS extending from the meningeal structures into the brain tissue showed local recurrence after resection of the tumor and histological investigations revealed transformation into a semi-malignant fibrohistiocytic tumor in one patient.³ Therefore, whether IMT-CNS is a different entity from IMT non-CNS remains controversial. Therefore, patients need close follow-up. The FHC variant often contains clonal rearrangements in chromosome band 2p23 that constitutively activate the *ALK* gene.⁶ *ALK* is a tyrosine kinase receptor that is normally expressed in the developing CNS. In IMTs located outside of the CNS, investigators have reported several fusion genes that render *ALK* oncogenic. *ALK* rearrangements with specific fusion genes have been reported in other types of cancer such as anaplastic large cell lymphoma, non-small cell lung cancer, and renal medullary carcinoma.

IMT of the CNS that express *ALK* can have an aggressive course despite gross total resection. The *ALK* expression in IMT of the CNS is specific to the FHC variant. Compared with IMT of the CNS that do not express *ALK*, the reported recurrence rate of *ALK*-positive tumors tend to be higher. Further research with longer follow-up is needed to clarify the natural history of this rare tumor.

CONCLUSION

Total resection IMTs should be achieved as these tumors recur often rapidly. Confirmation of the FHC variant by histopathology warrants searching for *ALK* expression. Such patients can be offered adjuvant therapy such as radiotherapy or novel *ALK* inhibitors.

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Giant Colloid Cyst of Third Ventricle: A Rare Case Report

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Abstract

Colloid cysts are rare non-neoplastic true epithelium-lined cysts of the central neuraxis, commonly arising in the anterior part of the third ventricle. They have a wide spectrum of clinical presentation being asymptomatic for a long time while some can present with paroxysmal headache, gait disturbance, nausea, vomiting, behavioral changes, weaknesses of lower limbs, impaired memory, new learning disability, and sudden death. Patients may remain asymptomatic cyst size more than 3 cm are defined as huge or giant colloid cyst. Only a few cases of huge colloid cysts have been reported in the literature. We present a case of a 62-year-old man with huge colloid cyst of the third ventricle causing obstructive hydrocephalus.

Key words: Anterior third ventricle, Giant colloid cyst, Hydrocephalous, Intraventricular cyst

INTRODUCTION

The colloid cysts are believed to be derived from either primitive neuroepithelium of the tela choroidea or from endoderm. Colloid cysts are benign lesions which constitute 0.55-2% of all intracranial tumors and comprise 55% of the third ventricle's lesions.¹

Approximately, three persons per million per year are affected from this condition.² Colloid cysts are commonly located near the anterior part of the third ventricle, close to the foramen of Monro. Most of the patients remain asymptomatic for the long time while some can present with paroxysmal headache or nonspecific symptoms to sudden death. Most of them are small in size <1 cm. The symptoms usually correlate with the location and the rapidity of increase in size and development of obstructive hydrocephalus. We report a rare case of huge colloid cyst.

CASE REPORT

The 62-year-old male patient presented with intermittent headache for 3 months and occasional drop attacks. On clinical examination, patient had no neurological deficits. Fundoscopy revealed papilledema. Hormonal levels were within normal limits.

Computerized tomography (CT) showed 3.2 by 2.8 cm non-contrast enhancing well-circumscribed homogeneously hyperdense mass extending from the third ventricle to lateral ventricles causing obstructive hydrocephalous (Figure 1).

Magnetic resonance imaging (MRI) shows isointense on T1 and T2 WS and hyper intense on fluid attenuated inversion recovery sequences suggestive of the third ventricular colloid cyst causing obstructive hydrocephalus (Figures 2-5).

Right frontal craniotomy was done, and frontal horns are approached through midfrontal gyrus transcortical - Transventricular approach. The huge bluish cystic lesion was identified in the lateral ventricle protruding through the foramen Monro.

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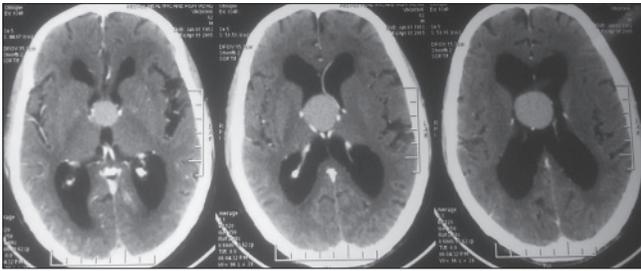


Figure 1: Contrast-enhanced computed tomography brain-S/O 3.2 cm x 2.8 cm giant non enhancing well-circumscribed hyperdense colloid cyst in third ventricle extending into lateral ventricles with obstructive hydrocephalus

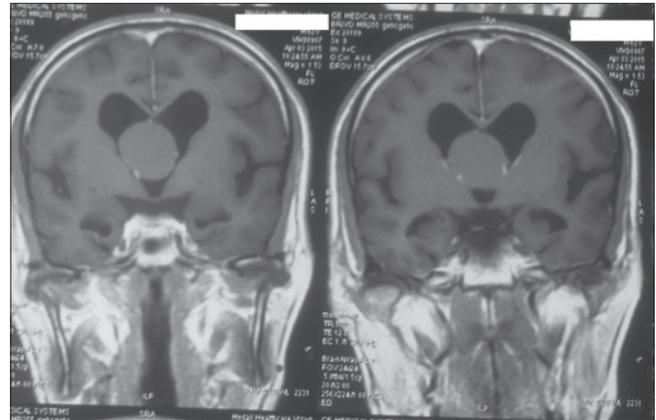


Figure 4: Coronal T1

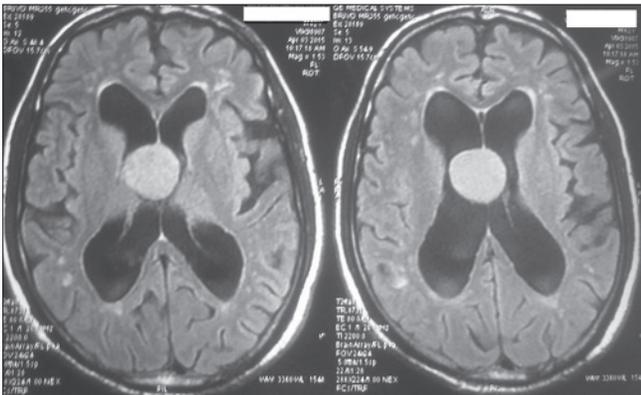


Figure 2: Magnetic resonance imaging brain axial T1 (WT)

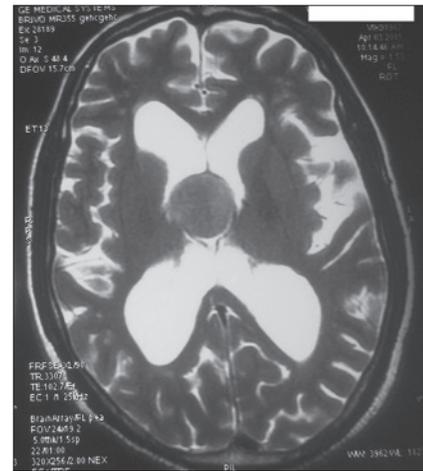


Figure 5: Axial T2

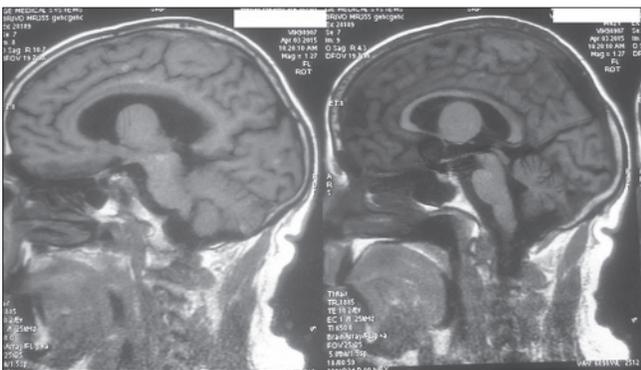


Figure 3: Sagittal T1

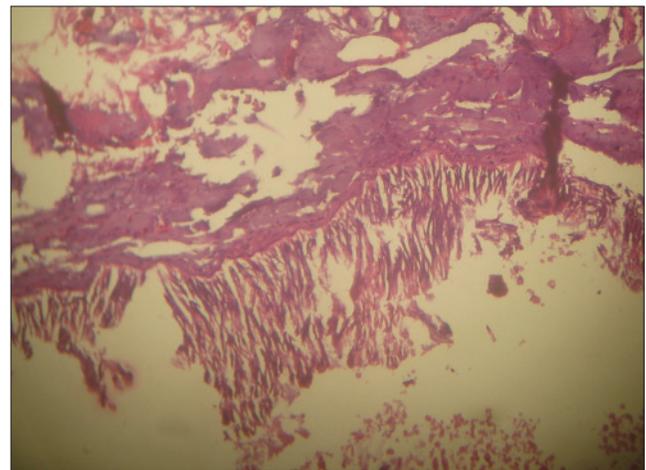


Figure 6: Histopathological slide of the colloid cyst: Pseudo stratified columnar ciliated epithelium with focal flattened and fibrocollagenous tissue with pink proteinaceous material toward the lumen side

Soft gelatinous viscous cystic component was aspirated from the cyst to decompress it. With meticulous dissection and gentle separation, cyst wall was completely excised. His intra-operative and post-operative period were uneventful. The patient was discharged on 10th post-operative period with no neurological deficit histopathological report has confirmed the diagnosis of colloid cyst (Figure 6). At 6 months of follow-up, he has no fresh neurological deficits and follow-up CT scan has mild hydrocephalus (Figure 7).

DISCUSSION

Colloid cysts are congenital lesions, either primitive neuroepithelium of the tela choroidea or endodermal



Figure 7: Post-operative computerized tomography scan brain axial section

in origin, classically located in the third ventricle. Derived from the Greek word “kollodes” meaning glue, cyst contains mucoïd and gelatinous matrix commonly lined by cuboidal and columnar epithelium or pseudo columnar or columnar mucous secreting epithelium.^{1,2} Approximately, one persons per million per year are affected by this entity with the prevalence of 1/8500 persons.¹ Though colloid cysts are congenital lesions, these cysts commonly present in fourth through the seventh decade of life, but cases have been reported in pediatric age group also.³

Colloid cysts are benign lesions and carry good prognosis and are mostly asymptomatic. If symptomatic, colloid cysts usually produce non-localizing signs of raised intracranial pressure usually associated with changing head position. Cysts larger than 3 cm called “giant colloid cysts.”^{4,5} Size of the colloid cyst usually ranges between 0.5 and 2.5 cm³. Most of the cysts are usually <1 cm and are asymptomatic, but size is not a good predictor of the outcome as sudden neurological decline and death can occur at any size, though such occurrences have been documented with cysts larger than 1-1.5 cm.^{2,3,6} Acute blockage of cerebrospinal fluid with instant brain herniation is one of the proposed mechanisms of sudden death. Another is the disturbance of hypothalamus-mediated cardiovascular reflex control.³ Hence, it is advised for a regular follow-up if asymptomatic and recommended to intervene if the patient become symptomatic or when the size is more than 1 cm. MacDonald *et al.* stressed that younger patients are more likely to become symptomatic during their lifetime and require surgery. Goyal *et al.* have emphasized that pediatric colloid cysts have a higher incidence of sudden worsening and a worse clinical profile as compared to adult colloid cysts.³

Though the rate of growth of the colloid cyst is uncertain, and it is not possible to predict which colloid cysts will become symptomatic, one predictor is MRI (T2-weighted images) where in colloid cysts with hyperintense signals on T2-weighted images were suggested to have higher water content and would be more capable of further cyst expansion. The low signal intensity on T2-weighted images have a higher intracystic viscosity contents with an increased difficulty to suck the contents while most high-signal lesions are easy to aspirate.⁷ These lesions are usually hyperdense on CT scan.⁸ One of the study has postulated from their observations in a study of 122 that there is a correlation between the CT scan cyst density with viscosity of the cystic contents. So, the colloid cysts with hyper density on CT scan can be managed by cyst aspiration more successfully compared with hypodense cysts.³ The MRI signal intensity of colloid cysts is notoriously variable, with any combination of T1- and T2-signal intensities. The most common appearance is hyper intensity in T1-weighted sequences and iso to hypo intensity in T2-weighted sequences. This variation is believed to be a result of the proteinaceous fluid, as well as the paramagnetic effects of the metal ions in the fluid and haemorrhage.^{7,8}

CONCLUSION

Colloid cysts are rare benign slowly growing cystic lesions commonly diagnosed incidentally on brain imaging for their small size and asymptomatic nature. These cysts are to be operated if they become symptomatic as sudden deterioration even to the extent of death can occur. Cyst can acquire large size and cysts larger than 3 cm called as huge cysts are very rare. We report one such rare case in Indian scenario second to one reported by VHS hospital, Chennai.⁴

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Fundus Macular Hypoplasia in a Case of Oculocutaneous Albinism

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Albinism comprises a heterogenous group of inherited disorders characterized by the reduction or total absence of melanin pigment biosynthesis from the eye, hair, and skin.

All the current known types of albinism are inherited as autosomal recessive fashion with the exception of ocular albinism, which is X-linked recessive.

Albinism has been classified as to type by the degree and the distribution of hypopigmentation as total versus partial, ocular versus oculocutaneous.

The prevalence of all types of albinism varies considerably worldwide and has been estimated at approximately 1/7000, suggesting that about 1 in 70 people carry gene for oculocutaneous albinism (OCA).

The clinical spectrum of OCA ranges with OCA1 being the most severe type with a complete lack of melanin production throughout life, while the milder forms OCA1B, OCA2, OCA3, and OCA4 shows some pigment accumulation over time.

The ocular consequences of pigmentary dilution are identical in all types of albinism:

- Nystagmus may be detected in first few months of life
- VA ranges from 20/80 to 20/400 but may be as good as 20/40 in some patients of OCA-2
- Patients are generally photophobic, and there is a high incidence of strabismus and astigmatic errors

of refraction. Color vision is generally normal. The amplitudes of the scotopic electroretinographic response may be more than normal, and a high electrooculographic Arden ratio may be recorded. Abnormal decussation of optic nerve fibers at the chiasma is seen with misrouting of the optic nerve fibers.

Anterior segment findings: A pink reflex is sometimes seen through the undilated iris (Figure 1). Retroillumination



Figure 1: Clinical picture showing undilated hypopigmented iris

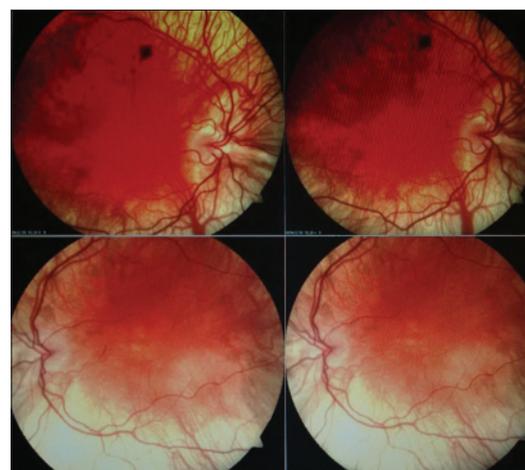


Figure 2: Fundus pictures shows prominence of the choroidal vasculature because of the lack or paucity of pigment in the overlying RPE and surrounding choroidal stroma

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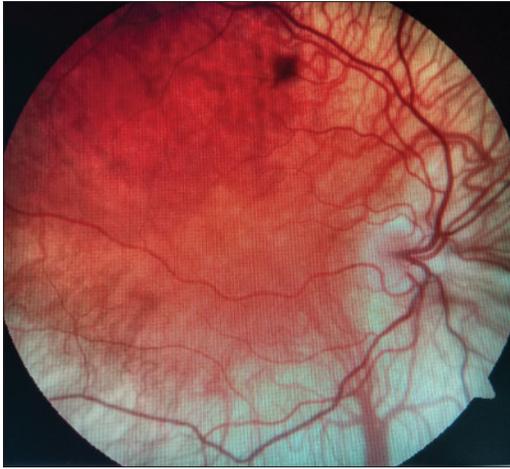


Figure 3: Fundus picture shows hypoplastic macula with the absent foveal pit. The retinal vessels fail to wreathe the fovea

shows transillumination through the iris and the globe. The outline of the lens can be seen.

Fundus findings: There is prominence of the choroidal vasculature because of the lack or paucity of pigment in the overlying RPE and surrounding choroidal stroma (Figure 2).

The macula is always hypoplastic and foveal pit is absent. Many post-mortem histopathological studies¹⁻³ shows no foveal pit or umbo but thick central ganglion and nuclear cell layers.

The retinal vessels fail to wreathe the fovea (Figure 3). Some pigment may be present in the presumed macular area, obscuring a view of the submacular choroidal vasculature. FFA findings in few studies showed multiple window defects in the RPE with normal foveal avascular zone.⁴ Patients with tyrosine positive OCA were more likely to demonstrate foveation than those with tyrosinase negative disease.

Points to Ponder

- The etiology of macular hypoplasia which is the most important factor causing visual impairment is not fully understood but may be related to reduced amount of melanin in the RPE. Hypoplastic macula may also be seen in aniridia and retinopathy of Prematurity.
- Differential Diagnosis includes entities that can present with cutaneous and ocular hypopigmentation namely waardenburg syndrome, vitiligo, congenital nystagmus, achromatopsia.

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Conservative Management for Recurrent Temporomandibular Joint Dislocation

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Temporomandibular joint (TMJ) dislocation is a condition when the mandibular condyle is displaced anteriorly beyond the articular eminence from its articulations and requires manipulation by another individual to return to its normal position.^{1,2} TMJ dislocation is subdivided

into acute, chronic/long standing dislocation, and recurrent dislocation. The predisposing factors are laxity of ligaments, capsule and ligament injury, degenerative joint disease, non-synchronized muscle function, the morphologic condition of the condyle and eminence. Conservative or surgical manipulation may be required to reduce the dislocated condyle.³

An 18-year-old female reported to the dental department with a chief complaint of inability to close the mouth; she was diagnosed to have TMJ dislocation. Manual reduction of the joint was done by Nilatons technique. After many attempts of manual reduction, she continued to have the same problem for many weeks. Following several unsuccessful attempts of manual reduction, the patient



Figure 1: Clinical picture after placing upper and lower arch bars



Figure 2: Clinical picture after placing posterior bite block on both sides



Figure 3: Clinical picture after placing elastics along with posterior bite blocks



Figure 4: Posterior acrylic bite blocks

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Figure 5: Orthopantomogram

was managed conservatively by placing upper and lower arch bars along with posterior acrylic bite blocks and application of elastic traction. After 3 weeks, the elastics and the posterior acrylic bite blocks were removed but the upper and lower arch bars were retained for 3 more weeks. The patient never got her joints dislocated in these 3 weeks, and finally the arch bars were removed. Every case of prolonged dislocation has its own unique features (Figures 1-5). Conservative approaches should be attempted initially; surgical treatment can be used only after these have failed.

Points to Ponder

- IMF with guiding elastics and posterior bite blocks after

reduction is recommended to allow inflammation and oedema to subside and to prevent redislocation

- Initially try all the conservative treatments first, surgical treatment can be used only after these have failed.

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