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Contemporary Views Regarding Prophylactic Third Molar Extraction among Dental Practitioners in Mumbai and Navi Mumbai City: A Cross-sectional, Questionnaire-based Survey

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Abstract
Background: The literature pertaining to third molar extractions is widespread and considered to be the most frequent procedure in oral and maxillofacial surgery. The prophylactic removal of asymptomatic impacted third molars is defined as the surgical removal in the absence of local pathology. Consensus states that extraction of symptomatic and/or diseased third molars is an appropriate treatment, however, prophylactic removal of asymptomatic molars is controversial among dental practitioners. Systematic reviews suggest no evidence either in support or against the prophylactic removal of asymptomatic impacted third molars, particularly from India thereby giving rise to the need of this study.

Materials and Methods: A cross-sectional analytical study carried out among 407 general dental practitioners and specialists from Mumbai and Navi Mumbai city in the span of 2 months. Variables such as age, gender, and qualification of the respondents were compared with the answering pattern thereby reflecting the knowledge attitude and practice.

Results: The present study evaluates the contemporary views and practices regarding prophylactic third molar extractions and shows a significant disparity among younger, middle-aged, and older dentists regarding the age group, investigations, techniques, and etiology pertaining to prophylactic third molar extractions. Majority of the dentists justify prophylactic third molar extractions, among which the number is significantly higher of younger dentists suggestive of the attitudes of the upcoming dental practitioners. Similar differences are noted among the male and female dentists and also among general and specialty dental practitioners.

Conclusion: The dentists should have a greater scientific foundation from a clinical standpoint in the decision-making process regarding prophylactic third molar extraction before concluding the treatment protocol.

Key words: Prophylactic removal, Prophylactic third molar extractions, Third molar extractions, Third molars

INTRODUCTION
Retention of third molars denotes position in which the occlusal plane is not reached on completion of root growth.

Tooth of which parts of crown reach the oral cavity or are connected with it through periodontal ligament apparatus of adjacent 2nd molar is said to be partially retained, whereas tooth which lacks connection with oral cavity are fully retained. Impaction refers to a tooth that has remained fully embedded in bone. Tooth is malpositioned of its axis or position deviates from normal direction. Third molar extraction is one of the most frequent procedures in oral surgery. Reported reasons for the third molar removal includes the risk of impaction as associated with caries, pericoronitis, periodontal defects in the distal surface of third molars, odontogenic cysts, and dental crowding.
Prospective studies suggest that dentists recommend extraction of third molars in 59% of patients in view of reducing the future problems, but the power to predict third molar eruption is low as most of the prediction has not been scientifically proven, thereby cannot be reliable. Systematic reviews suggest no evidence either in support or against prophylactic removal of asymptomatic impacted third molar even in adults, which brings us to conduct this survey, even after extensive literature search, we could not find any study which clearly indicated any opinion about prophylactic third molar removal, particularly from India thereby giving rise to the need of this survey.

MATERIALS AND METHODS

The present study was a cross-sectional analytical study carried out among 407 general dental practitioners and specialists from Mumbai and Navi Mumbai city (aged from 21 to 70 years, mean 33.24 ± 9.35) in the months of January and February, 2017.

A total of 440 questionnaires were distributed of which 410 were returned back giving a response rate of 93.18%.

Before the start of the study, a study protocol was submitted to the Institutional Ethics Committee which was reviewed by two-blinded reviewers, and due clearance was obtained from the same. Furthermore, necessary permissions were obtained from the principal of the dental college.

The instrument to record responses was a self-designed questionnaire consisting of two parts: Section I collected the demographic data (such as age, gender, and qualification) of the respondents, whereas Section II comprising of questions collected information about knowledge, attitude, and practice regarding prophylactic third molar extraction. The language of questionnaire was English.

Before the start of the main study, a pilot study was conducted among 25 practicing dentists and faculty from the same institution to check validity and reliability of the questionnaire. These study participants were not included in the main study. After a thorough discussion, two questions were changed initially which were leading to loss of meaning. Thus, construct validity could be obtained for the final questionnaire (Cronbach’s alpha = 0.92).

Mode of delivery of questionnaires was hand-to-hand personal visit to respective clinics with two rounds of follow-up for non-responding participants in the city of Mumbai and Navi Mumbai. Participation in the present study was kept voluntary and anonymous. Only those who were willing to fill the questionnaire and thereby participating in the study were included. Practitioners absent/not willing to participate/not willing to meet the primary investigator were excluded and another practitioner was substituted in the same place from the same cluster.

To get a representative sample of the entire geographical area, the city, and suburbs of Mumbai and Navi Mumbai were divided into four blocks (clusters), and simple random sampling was followed in each of the clusters. This type of sampling technique ensured equal representation of older and newer clinics, clinics from main city and peripheral suburbs, involvement of general and specialty practitioners, young and old practitioners of both genders. Sample size was determined using single proportion formula with four cluster design as follows:

\[
n = \left(\frac{Z_{\alpha}}{d}\right)^2 \left[p \left(1-p\right)\right]
\]

Where,

- \(Z_{\alpha}\) is the Z variant of type I error which is equal to 1.96 (constant).
- \(p\) is equal to expected proportion of knowledge level among study participants taken as 50%.
- \(d\) is equal to expected error in the study taken as 5%.

Thus, a sample size of 100 per cluster was obtained giving a total sample size of 400.

Statistical Analysis

All filled questionnaire forms were scrutinized for completeness of responses. Those which had missing entries were excluded. A final set of 407 questionnaire forms were serially numbered. Data were compiled onto MS-office Excel sheet for Windows (version 2010) and subject to statistical analysis using Statistical Package for the Social Sciences Software (SPSS version 22.0 IBM) and primer of biostatistics software. Demographic details of the study participants and responses to each question have been depicted as frequency (n) and percentage (%). Association of answering pattern of each question with independent variables such as age, gender, and qualification was calculated using Chi-square test. In case of multiple responses, a sum total of frequency for each response was calculated. \(P < 0.05\) was considered to be statistically significant keeping \(\alpha\) error at 5% and \(\beta\) error at 20%.

RESULTS

The present study carried out among 407 dental practitioners in Mumbai and Navi Mumbai city during the months of January and February, 2017 had participants...
with the mean age 28.42 ± 3.75 with 223 (54.79%) females and 184 (45.20%) males, 239 (58.72%) BDS, and 168 (41.27%) MDS. Frequencies and percentages of each of the 17 questions have been presented in Table 1.

**Age Wise**

In comparison of age with various responses, majority of the dental practitioners considered 18-30 years as the most commonly visiting age group for prophylactic third molar extractions among which the number of younger dentists \(n = 180\) was significantly greater as compared to middle-aged \(n = 100\) and older-aged \(n = 65\) dentists \((P = 0.002)\). Most of the younger-aged \(n = 161\) and middle-aged \(n = 81\) dentists prefer consulting oral surgeons for prophylactic third molar extractions as compared to older dentists \(n = 46\), however, the number of younger dentists was significantly higher than middle-aged dentists. Whereas, majority of the older dentists \(n = 53\) prefer

| Table 1: Responses to all 17 questions (frequency and percentage) |
|-------------------|-----------------|-----------------|
| **Questions** | **Responses** | **Frequency n (%)** |
| Commonly encountered age group. For prophylactic third molar extraction | <18 years | 24 (5.530) |
| | 18-30 years | 346 (79.724) |
| | >30 years | 64 (14.747) |
| Referral of patient for prophylactic third molar extraction | Self | 333 (72.078) |
| | Referred by dentists | 80 (17.316) |
| | Referred by orthodontists | 28 (6.061) |
| | Others | 20 (4.329) |
| | No response | 1 (0.216) |
| Prophylactic third molar extractions performed by | Self | 161 (35.076) |
| | Oral surgeon | 285 (62.092) |
| | Others | 8 (1.743) |
| | No response | 5 (1.089) |
| Awareness about any guidelines related to prophylactic third molar extraction | Yes | 35 (8.600) |
| | No | 345 (84.767) |
| | No response | 27 (6.634) |
| Patients presenting any past history of pain/swelling | Yes | 373 (91.646) |
| | No | 30 (7.371) |
| | Sometimes | 3 (0.737) |
| | No response | 1 (0.246) |
| Common reasons for patients visiting the dental clinic for prophylactic third molar extraction | Undergoing orthodontic treatment | 86 (18.182) |
| | Before orthodontic treatment | 80 (16.913) |
| | Any pathology associated | 242 (51.163) |
| | All patients willingly | 40 (8.457) |
| | Others | 13 (2.748) |
| | No response | 12 (2.537) |
| Routinely carried out investigations before third molar extraction | IOPA | 104 (16.801) |
| | RVG | 92 (14.863) |
| | Lateral cephalogram | 7 (1.131) |
| | Lateral oblique | 1 (0.162) |
| | OPG | 325 (52.504) |
| | CBCT | 81 (13.086) |
| | Others | 6 (0.969) |
| Preference of extracting opposing third molars for the patients who had undergone opposing third molar extractions | Yes | 252 (61.916) |
| | No | 155 (38.084) |
| Cost-effectiveness of prophylactic third molar extractions in view of complications | Yes | 288 (70.762) |
| | No | 107 (26.290) |
| | No response | 12 (2.948) |
| Inclusion of post-operative complications in the consent form | Yes | 307 (75.430) |
| | No | 99 (24.324) |
| Abandonment of prophylactic third molar extraction cases in view of post-operative complications | Yes | 128 (31.450) |
| | No | 257 (63.145) |
| | No response | 22 (5.405) |
| Variation in terms of charges for prophylactic and symptomatic third molar extractions | Yes | 69 (16.953) |
| | No | 331 (81.327) |
| | No response | 7 (1.720) |
| Justifiability of prophylactic third molar extractions | Yes | 317 (77.887) |
| | No | 74 (18.182) |
| | Can’t say | 16 (3.931) |

*Indicates overall percentages of each response exceeding/reduced the total because of multiple/non-response
extracting on their own ($P < 0.05$). Majority of dentists discern association of pathology as the most common reason for patient consultation among which the number of younger dentists ($n = 127$) is significantly greater followed by the number of older- and middle-aged dentists. In opinion of maximum number of dentists ($n = 325$), panoramic radiographs are the most widely used investigation technique in which the number was significantly high of younger-aged dental practitioners ($n = 170$) as compared to middle-aged ($n = 91$) and older-aged ($n = 64$) practitioners. Few of the younger practitioners consider IOPA and RVG as the subsequent common investigation modality which is closely followed by middle- and older-age group of dentists. Few of the younger dentists also consider other investigation techniques, whereas only few of middle-aged and older-aged dentists consider opting other investigation techniques ($P < 0.05$). Significantly greater number of dentists ($n = 252$) prefer extracting opposing third molars prophylactically when the patient has undergone opposing third molar extraction among which the number of younger dentists ($n = 121$) is significantly higher than middle-aged ($n = 69$) and older-aged ($n = 62$) group of dentists ($P = 0.041$). Almost all of the dentists ($n = 347$) justify prophylactic third molar extraction among which younger dentists ($n = 170$) are significantly larger in number in relation to middle-aged ($n = 90$) and older-aged dentists ($n = 57$) ($P = 0.009$).

**Gender Wise**

In comparison of gender with various responses, majority of both female ($n = 148$) and male dentists ($n = 141$) prefer consulting an oral surgeon for prophylactic extraction of third molars, whereas few of the female dentists ($n = 88$) prefer extracting on their own and a relatively less number of male dentists ($n = 83$) prefer extracting on their own. A significantly higher number of male dentists prefer an OPG ($n = 150$) followed by IOPA and RVG as an investigatory modality in comparison to female dentists who prefer IOPA ($n = 54$) more commonly over RVG and OPG. Considerably higher number of female dentists ($n = 45$) opt for CBCT as compared to their male ($n = 35$) counterparts. A slightly larger number of male dentists ($n = 128$) prefer extracting opposing third molar in comparison with females ($n = 124$), but the female dentists have a much higher number ($n = 99$) of negative response as compared to males ($n = 56$). In the opinion of the oral surgeons carrying their own consent forms, most of the male dentists ($n = 105$) answered no, whereas in contrast, most of the female dentists ($n = 99$) answered yes ($P < 0.05$).

**Qualification Wise**

Significantly larger number ($n = 104$) of general dental practitioners (BDS) prefer extracting third molars on their own in comparison with the number ($n = 57$) of specialty dental practitioners (MDS). Majority of both consult oral surgeons for the same, however, the number of general dentists ($n = 152$) is significantly greater than their specialist counterparts ($n = 137$) ($P = 0.022$). Majority of the general dentists ($n = 108$) have their oral surgeons carrying their own consent form in comparison to very few specialty practitioners ($n = 47$) ($P < 0.05$).

**DISCUSSION**

According to the American Association of Oral and Maxillofacial Surgeons (AAOMS), “if there is no sufficient anatomical space for normal eruption, then extraction of such teeth at an early age is a valid and scientific management based on medical necessity.”\(^7\) It is seen that impacted third molars in adolescents are most likely to develop pathologic indication, whereas impacted third molars in adults are unlikely to undergo significant pathological changes.\(^2\) The ideal age to determine whether or not to remove third molars is still under debate since impaction prediction has not been scientifically proven and it is a daunting task to predict this biological condition with any degree of reliability.\(^3\) In our study, majority of the dentists consider 18-30 years (346) 79.72% as most common age group of patients undergoing prophylactic third molar extraction. Similarly, Blondeau and Daniel stated that these extractions should be done well before the age of 24 years particularly in female patients, and that older patients are at a greater risk of post-operative complications and permanent sequelae.\(^4\) However, this is inconsistent with recent literature which suggests the treatment for asymptomatic impacted third molars in young adults, might be observation instead of prophylactic removal.\(^5\) Approximately 75% of individuals who receive regular dental care have their third molars removed.\(^6\) In our study, maximum dentists (333) 72% stated that majority of the patients come on their own for prophylactic third molar extractions rather than referred by other dentists or orthodontists. Whereas, in a prospective study, it was shown that 59% of the patients were recommended by the general dentists for prophylactic third molar extractions mainly to prevent the future problems or because a third molar had an unfavorable orientation or was unlikely to erupt.\(^7\) It was also noted by some authors that routine removal of asymptomatic unerupted or impacted third molars should not be recommended as the incidence of pathologies associated with them is extremely low and insignificant.\(^7,8\) In a study on prophylactic removal of mandibular third molars in late 1980s, the number of molars designated for removal varied between 0 and 26 for general dental practitioners and between 3 and 21 for oral surgeons.\(^9,10\) A great variation was observed among general dental practitioners and oral surgeons regarding asymptomatic
third molar extractions by Knutsson et al, Fuster Torres et al, in their study noted that most common reason for patient reference to their service of oral surgery by primary care dentists for prophylactic removal of third molars was 51.0% versus 46.1% in case of oral surgeons. On the contrary to our study (285), 62.09% of majority opted for consulting oral surgeons for performing prophylactic third molar extraction compared to general dental practitioners. This was consistent with the survey of Brazilian Oral and Maxillofacial Surgeons which stated that trainees in third molar surgery tended to recommend asymptomatic third molar extractions more frequently as compared to experienced oral and maxillofacial surgeons. In 1979, the National Institutes of Health held a consensus conference to try and formulate the guidelines on indications for third molar removal. It was a well-defined set of criteria for indications of third molar removal when there was evidence of pathosis. Similarly, the National Institute for Clinical Excellence Guidance on third molar teeth describes the various complications which may occur from the extraction of third molar teeth but does not describe its benefits. These guidelines are predominantly aimed at oral surgeons. In our study, majority dentists (345) 84.76% were unaware about any guidelines regarding prophylactic removal of third molars. Only 4.29% of the dentists were aware about the guidelines among which all were oral surgeons. There are several reasons why most clinicians are not influenced by written practice guidelines. One reason is that these guidelines are focused not on clinicians but on the current state of scientific knowledge. There are no specific guidelines in literature which suggest prophylactic removal of third molars to avoid post-operative complications. On the contrary, current UK guidelines for the treatment of third molars are against prophylactic removal of clinically asymptomatic impacted teeth. Many asymptomatic third molars are discovered on routine panoramic radiographs but pain is the most frequent complaint. Alling and Alling recognized that there can be clinical or radiographic signs of pathosis associated with a third molar which seems asymptomatic clinically and no symptoms by the patient. In our study, majority (373) 91.64%, answered “yes” for the past history of pain or swelling associated with the third molars. Thus, “asymptomatic” does not mean risk-free, which may only be used to describe the not-so-common condition of a third molar which has erupted in satisfactory functional occlusion without periodontal pathosis, or remained deeply embedded without signs of pathosis or eruptive movement over an extended period. According to Adeyemo, some reports in the literature have estimated the proportion of impacted asymptomatic third molar extractions to be between 18.0% and 50.7%. Similarly, in another study, it is evident that there was no difference between the mean number of molars scheduled for removal between gross domestic products and oral surgeons of Sweden and Wales. However, in both the countries, the number of molars scheduled for prophylactic removal varied widely. In our study, for average number of extractions performed in 1 month, the mean for symptomatic extractions is 6.76 ± 5.67 and mean for prophylactic extractions is 2.49 ± 3.11. According to Friedman, 50% of maxillary third molars which are classified as impacted will erupt normally with minimal discomfort if not removed prematurely. Only 12% of truly impacted teeth will develop pathological lesions such as cysts or damage to the adjacent teeth. In our study, majority dentists opted association of pathology (242) 51.16% to be the most common reason for patients consulting dental clinics for prophylactic third molar extractions followed by undergoing orthodontic treatment by (86) 18.18% and before orthodontic treatment by (80) 16.91%. Similarly, in another study, the principal reason for patient consultation was pain (50%) and infection (30.8%), that is, association of pathology, whereas principal indication of third molar extraction was prophylaxis followed by orthodontic reasons according to both the primary care dentists and the oral surgeon. However, in a study, it was stated that prophylactic extractions to prevent late anterior crowding was completely contradicted. In our study, for the question, common complication after retention of prophylactic third molar extraction majority opted for pulpal or periapical pathology in relation to the second molars followed by orthodontic complications such as crowding/orthodontic relapse/malocclusion followed by pericoronitis followed by cyst formation followed by cheek biting/temporomandibular joint (TMJ) problem/nerve problem. Alling and Alling have cited observations of Goodsell - more 2nd molars are lost due to third molars being left in place than any other single reason. This includes unerupted and erupted wisdom teeth. However, in another survey it was stated that tilted third molars may not always be the guilty factor for causing caries in the second molar. Daly TD also stated that the incidence of dental caries of second molars varied from 1% to 4.5%, Fear of second molar caries is not a justification for prophylactic removal. According to David, the decision of removal or retention of third molars for orthodontic patients could be postponed until the end of treatment, except those cases where it is mandatory before treatment. The association of lower incisor crowding and impacted third molars is not significant. Lindqvist and Thilander concluded that “the space change on the extraction side was improved relation to the control side in 70% cases, hence extraction could be recommended in severe crowding.” According to Dr. Safeena, pericoronitis is the most common indication for third molar surgery. A study reported that over 4 years of follow-up, 10% of lower third molars develop pericoronitis. Shafer et al. have
reported an incidence of cyst formation associated with impacted third molar of 2.31%.29

Many techniques have been applied for the prediction of asymptomatic third molar impaction or eruption among which are panoramic radiographs, intraoral periapical radiographs, lateral cephalograms, and cone-beam computed tomography (CBCT) estimating the relationship between the third molars and space available for eruption. Panoramic radiograph is the standard imaging technique used widely. However, magnification and distortion defects are common which may lead to difficulty in assessing the exact position of wisdom tooth, whereas CBCT is the most appropriate technique. In our study, most common investigation done before prophylactic third molar extraction, majority answered it to be OPG (325) 52.50% followed by IOPA (104) 16.80% followed by RVG (92) 14.86% followed by CBCT (81) 13.08% followed by lateral cephalogram (7) 1.13% followed by others (including blood investigations) (6) 0.96% followed by lateral oblique (1) 0.1%. In a study of Brazilian OMFS, it was shown that few oral surgeons tended to extract impacted deep third molars based only on the findings of panoramic radiographs and also performed coronectomy twice as frequently to access deep lower third molars without resolving to CBCT.12 White and Profit suggested that an asymptomatic third molar does not always mean pathology free. Hence, radiographic assessment is mandatory before indicating extraction to exclude existence of underlying pathologies.30 Reviews suggest that mandibular third molars are scheduled more commonly for extraction as compared to maxillary third molars. However, this is likely to be accompanied by subsequent extraction of maxillary third molars for the prophylactic benefit of avoiding sequelae resulting from the unopposed supraeruption of the opposing tooth.17 In our study, majority answered yes (252) 61.91% for extracting opposing molar if the opposing molar has been extracted. Furthermore, Adeyemo et al. corroborated this for the avoidance of the risk of increased morbidity following pathology associated with retained impacted third molar.1 In a study sponsored by AAOMS seems to conclude that it may be cost-effective to remove third molar before patient’s 25th birthday. The United States nearly spends some 3 billion dollars annually to remove impacted third molars. According to Hill, even a 30% reduction on that figure would represent huge saving.31 In our survey, for the question of cost effectiveness of prophylactic third molar extraction in view of complications in the future, majority answered option yes (288) 70.76%. This is inconsistent with the review of Kandaswamy where it is stated that extraction of third molar without pathology involves more expenditure to the patients as well as risk of post-operative complications.32 Rate of complications according to Dr. Safeena after removal of third molars was 11.8% in youths (age 12-29) and 21.5% in older age (age 25-81). Furthermore, there will be more complications following prophylactic third molar extraction rather than pathologically involved third molars.3 Baqain has stated pain, swelling and trismus to be the most common post-operative complications.32 Whereas, in our study, most common was pain/swelling followed by dry socket followed by paresthesia followed by trismus. In a retrospective study, it was stated that mandibular third molars requiring osteotomy have a greater risk of post-operative complications.33 According to Navvab et al., pain was the most common complication whereas mandibular fracture was the least common. Furthermore, horizontally angled molars posed the most complications.34 In our study, although angulation of molars was not taken into consideration and it was a drawback. In a study, incidence of paresthesia has been reported to occur in 1-5% of patients undergoing third molar removal, whereas the rate of TMJ symptoms was much higher.35-37 According to Song et al., rate of dry socket varies from 0% to 35%.3 It was shown in some health-care institution audits that the patients having their third molar removed for no valid reason ranged from 18% to 60%.38-41 Whereas, in our study, the mean response for patient agreement for prophylactic third molar extraction was 40.73 ± 28.56. It is of paramount importance to inform the patient about the possible complications that may occur during and after the treatment, making them aware of the fact that any unexpected situation should be dealt with best possible way before any surgical procedure. The four most common post-operative complications reported in the literature of third molar removal are localized alveolar osteitis, infection, bleeding, and paresthesia.42-44 Incidence of inferior alveolar and lingual nerve injuries reported ranged from 0.4% to 22% but most of these injuries undergo spontaneous recovery.44 In our survey, majority (307) 75.43% answered yes for inclusion of post-operative complications in the consent form among which pain/swelling was most commonly included as a complication in the consent form followed by trismus, paresthesia, post-operative bleeding, and fracture/TMJ problems. In our study, majority of the dentists/oral surgeons (257), 63.14% did not agree in abandoning prophylactic third molar extractions in view of post-operative complications. Most authors agree that each particular situation should be analyzed and impacted third molar removal should not be generalized.11 According to the literature, the probability of pathological changes caused by impacted third molar seems to be exaggerated, also the surgery is not risk free, it includes both personal and economic costs associated with the removal of asymptomatic third molar teeth. In our study, majority opted for similar charges for prophylactic and asymptomatic third molar extractions (331) 81.32%, whereas few (69) 16.9% agreed for varying charges in view.
of associated complications, underlying pathologies, and requirement of pre-medication and investigations before third molar extractions. Consensus states that extraction of symptomatic and/or diseased third molars is an appropriate treatment; however, prophylactic removal of asymptomatic molars is controversial among practitioners. Although exceptions should be recognized, the elective removal of asymptomatic third molars limits the establishment of pathology and minimizes adverse outcomes. In our study, majority (317) 77.88% considered prophylactic extraction of third molars to be a justified procedure, however, (74) 18.18% disagreed and (16) 3.93% did not respond.

CONCLUSION

The dentists should have a greater scientific foundation from a clinical standpoint in the decision-making process regarding prophylactic third molar extraction. Our charge, as dentists, is to thoroughly assess the patient’s unique circumstances, to educate our patients on their condition, utilize the existing evidence, and to provide our best advice and care for the management of the particular oral condition.35

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A Study on Open Versus Closed Reduction of Mandibular Condyle Fractures and Their Management

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INTRODUCTION

The incidence of Faciomaxillary injuries is very high due to road traffic accidents (RTA). Among the Faciomaxillary injuries, the mandible fracture is the most common type. Among the mandible fractures, the incidence of condylar and subcondylar type is on the rise.¹-⁴ Management of condylar and subcondylar fracture of mandible remains a controversy so far it is managed by closed method (maxillomandibular fixation [MMF]). Open reduction is rarely attempted. In recent years, open treatment of condylar fractures with rigid internal fixation (RIF) has become more common.³ Open reduction of condylar fractures needs high technical skill and expertise. It needs thorough knowledge of anatomy as it needs meticulous planning dissection and execution. Hence, open reduction of condylar fractures is not routinely done. However, there are definite indications for open reduction of condylar fracture. Management of condylar fracture varies from case to case.⁵-⁷

Aim

To study the incidence etiology and various types of mandible fractures esp. condylar and subcondylar fractures,
indications and techniques for closed and open treatment of condylar and subcondylar fractures.

**MATERIALS AND METHODS**

A prospective study conducted in the Department of Plastic Surgery, Government Rajaji Medical College hospital, who was diagnosed, as patients with fracture of mandibular condyle were included in the study. Patients admitted with Faciomaxillary injury diagnosed to have condylar and subcondylar fracture with the help of relevant history, clinical examination, radiological evaluation, and their management and outcome.

**Inclusion Criteria**

Patients admitted in faciomaxillary unit with fracture mandible, age more than 14 years, both male and female.

**Exclusion Criteria**

Patients admitted in Faciomaxillary unit without fracture mandible. All these necessary data were recorded in a pro forma. 175 patients of mandibular fractures were registered in the Plastic Surgery Department, among them, 43 condylar fractures were registered during the study period. Detailed history regarding nature of injury and symptoms were obtained. A thorough physical examination was done to assess the general status of the patient. Assess other major and minor injuries, site and number of fractures of the mandible and the type of condylar fracture; unilateral or bilateral and intra articular or extra articular. Investigations were done which included X-ray skull anteroposterior/lateral view, X-ray mandible posteroanterior view and lateral view, orthopantomogram, computed tomography (CT)-scan with three-dimensional (3D) reconstruction as required. After thorough clinical and radiological evaluation, stabilization of the patient and ruling out other injuries. Patients were randomly selected based on surgeon’s availability and surgeon’s performance at the time. For instance, cases with adequate mouth opening, with normal occlusion, vertical height of ramus maintained, with comminuted fracture, who fall under geriatric or pediatric age group and all intracapsular un displaced fractures can be managed conservatively by closed reduction with MMF-arch bars or IMF done. Likewise, cases with reduced mouth opening, with malocclusion or with any occlusal derangement, with reduced vertical height of the ramus, with gross displacement of fractured fragments, associated with other injuries are managed surgically by open reduction and internal fixation with mini plates and screws, followed by MMF in some cases. When the associated fracture needs open reduction and internal fixation (ORIF), after completing the ORIF for associated fracture condyle fracture is assessed intraoperatively. Closed reduction of condylar fracture done and case assessed if after closed reduction occlusion is maintained mouth opening is adequate then proceeded with MMF patient managed by CRMF for condylar fracture. Even after closed reduction stable occlusion and adequate mouth opening are not achieve then open reduction condylar/subcondylar fracture is done. Management of condylar fracture was done either by open or closed method according to indications and contraindications as discussed above and earlier.

**RESULTS**

In our study, 43 patients of condylar fracture registered. Majority of patients fall in the 21-30 groups. Majority of injuries occurring in male population. Radiological diagnosis shown 48.8% of cases are left side, 25.6% are right side followed by 14% symphysis (Table 1).

Among 43 cases, 13 cases are unilateral condylar fracture and 11 cases bilateral condylar fracture, 16 cases unilateral subcondylar fracture, 5 cases bilateral subcondylar fracture. Among them, isolated condyle fracture is 7 - unilateral 4 and bilateral 3. The most common associated site of fracture - para symphysis 37%, pan facial 16.3%, and symphysis 14% (Tables 2-4). In 43 condyle fracture, 51% were intracapsular fracture, and 49% were extracapsular fracture (Table 5).

Malocclusion is significantly higher in CRMF (4 cases 10%) but in ORIF no occlusion ($P = 0.045$) significant.

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<th>Table 1: Distribution of radiological diagnosis</th>
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<th>Table 2: Distribution of pattern of injury</th>
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<th>Table 3: Distribution of isolated condyle</th>
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<td>Bilateral condyle</td>
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<td>Unilateral condyle</td>
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Restricted cases significantly higher CRMF cases 1 in ORIF and 5 in CRMF it is statistically significant $P = 0.039$. In CRMF group, 5 patient developed severe restricted mouth opening 4 cases developed malocclusion and vertical height of ramus is shortened in 4 cases (Tables 6 and 7).

Among the 26 cases, who underwent ORIF most common approach used is combined approach (preauricular + risden/modified sub mandibular). Risden approach is single most common approach used for subcondylar fractures (Table 8).

All ORIF cases developed post-operative facial edema which subsided gradually with head end elevation and appropriate analgesics in 3-5 days. One case developed hematoma, which was evacuated and managed conservatively. Three cases developed temporary facial nerve palsy commonly frontal branch, which recovered spontaneously in few weeks. Three cases developed transient mouth opening restriction due to severe pain and muscle spasm, which recovered subsequently. One case developed implant migration, which was managed by implant exit. In one another, case implant exit was done to remove the infected implant after 3 months (Tables 9 and 10).

**DISCUSSION**

Mandibular condyle fracture is very common fracture among mandibular fractures; the treatment methods for mandibular condyle fracture have been controversial. However, regardless of the treatment option, the purpose of the treatment of mandibular condyle fracture is to recover normal TMJ function via the reconstruction of appropriate anatomical position. Thus, assessment of treatment success, as well as the outcomes of an early treatment, should be constructed based on complications such as TMJ derangement, ankyloses of TMJ, or growth disorder via long-term follow-up. Therefore, it is important to control functional complications and aesthetic problems from a long-term perspective. The final goal of the treatment lies in the achievement of occlusal stability, normal mouth opening, normal TMJ movement, prevention of temporomandibular joint derangement and joint pain, and prevention of growth disorder in patients with mandibular fracture by selecting an appropriate treatment method between closed and open reductions. Based on the guidance-formulated management of each case decided. Based on certain important criteria such as mouth opening, occlusion, vertical height of ramus of the mandible, age with associated injuries, type of fracture unilateral or bilateral, intracapsular or extracapsular, simple or comminuted fracture, and medially displaced or laterally displaced

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<td>Number of cases (%)</td>
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<td>Number of cases (%)</td>
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<th>Table 9: Distribution of complications</th>
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<td>Late complication</td>
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<td>Infected implant and implant exit</td>
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<tr>
<td>Facial nerve palsy</td>
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<td>Loosening and displacement of screw</td>
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we have planned all condylar fracture management. For instance, cases with adequate mouth opening, with normal
occlusion, vertical height of ramus maintained, with comminuted fracture, who fall under geriatric or pediatric age group and all intracapsular undisplaced fractures can be managed conservatively by closed reduction with MMF-arch bars or IMF done. Likewise, cases with reduced mouth opening, with malocclusion or with any occlusal derangement, with reduced vertical height of the ramus, with gross displacement of fractured fragments, associated with other injuries are managed surgically by open reduction and internal fixation with mini plates and screws, followed by MMF in some cases. When the associated fracture needs ORIF, after completing the ORIF for associated fracture condyle fracture is assessed intra operatively. Closed reduction of condylar fracture done and case assessed if after closed reduction occlusion is maintained mouth opening is adequate then proceeded with MMF patient managed by CRMF for condylar fracture. Even after closed reduction stable occlusion and adequate mouth opening are not achieve then open reduction condylar/subcondylar fracture is done. As high-velocity injury as common cause (RTA), combined and severely displaced fracture is on the rise. Hence, there is increased need for ORIF.

Ellis et al.\(^8\) reports that at 6 weeks 17.2% had facial nerve weakness, (2.3%) had developed salivary fistulae, in 50% a visible scar was seen. 2% of the surgical scar were hypertrophied.

Zide and Kent,\(^9\) Klotch and Lundy,\(^10\) and various other authors have all suggested various indication for ORIF in mandibular condyle fracture which includes condyle displacement into middle crania fossa or lateral extracapsular displacement, edentulous patients with bilateral condylar fracture, condyle fracture with comminuted midface fracture, gap between fracture segment more than 5 mm without any contact between the segment, and angulation more than 30\(^\circ\) between fracture segment. Considering newer fixation techniques American Association of Oral and Maxillofacial Surgeons\(^11\) suggested an international guideline on the treatment of mandibular condyle fracture.

De Riu et al.\(^12\) noticed a ramus height reduction of >3 mm in 9% of the closed group patients while no reduction was seen in the surgically treated group. The mean vertical heights were similar in both groups as reported by Carneiro et al.\(^13\) Between 1 month and 1 year we found CRMF group had the significant reduction in ramus height than in the ORIF group.

Approach for mandibular condyle fracture depends on fracture site and degree of bone fragment displacement. In general, they include preauricular approach, postauricular approach, submandibular approach, Risdon approach, combined approach, and retromandibular transparotid approach. Among the various surgical approaches reported in literature, the retromandibular transparotid and submandibular approaches emerge as the most commonly used procedures to expose the condylar fracture, and the intraoral approach has been suggested only for low condylar fractures.

**CONCLUSION**

The incidence of condyle and subcondyle fracture is 7.9%. Physical examination will often identify the location of fracture, which can then be verified radio graphically. Increasing vehicular traffic and urban violence, accidents and assaults are forming the majority of causes of mandibular fractures. CT scan with 3D reconstruction and good orthopantomogram has given us an accurate way of detecting even small fractures. Newer developments in the allied specialties of medicine, patients with concomitant injuries can be managed efficiently, simultaneously treating the mandibular fractures. Intraoral incisions, which avoids an external scar, it provides the necessary access caters to the aesthetic expectations of the patient. Using mini plates and screws have significantly reduced the post-operative morbidity of the patient to a great extent, allowing for an early mobilization. Adhering to road traffic rules will prevent the RTA, mandible fractures.

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A Radiology-pathological Correlation of Renal Cell Carcinoma in a Tertiary Care Hospital - A Retrospective Study

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Abstract

Introduction: This study was conducted to understand the clinical algorithm of renal cell carcinoma (RCC). Correlation was done by a clinical presentation with radiological features and histopathology of RCC. The stress upon to understand the necessity for a team approach between clinician, radiologist, and pathologist and vice versa is emphasised.

Aim: The aim of this study was to correlate the histopathology of RCC with the radiological features.

Materials and Methods: The total number of renal tumors studied during the 8-year period was 45 cases, of which 25 cases were diagnosed by histopathology as various types of RCC conclusively. This is a retrospective study of renal tumors, diagnosed by histopathology as various types of RCC. All the relevant clinical data of the patients were searched from the ward records. The various radiological features were collected.

Results: The total number of renal tumors studied during the 8-year period was 45 cases, of which 25 cases were diagnosed by histopathology as various types of RCC conclusively. Magnetic resonance imaging provides molecular information with regard to RCC and potentially aid in biopsy planning. The total cases reported in the department are 25 cases out of which 16 cases are attending follow-up after 3 years.

Conclusion: The Fuhrman grading of RCC correlated grading of RCC. Pre-operative radiological classification can be used as a supplement to the histopathological grading. RCC needs correlation between radiologist, pathologist, and clinician.

Key words: Chromophobe renal cell carcinoma, Clear cell renal cell carcinoma, Magnetic resonance imaging, Multidetector computed tomography, Papillary renal cell carcinoma, Treatment protocols, Tumor staging (TNM)

INTRODUCTION

Representing 2-3% of adult cancers, renal cell carcinoma (RCC) accounts for 90% of renal malignancies and is the most lethal neoplasm of the urologic system. RCC is a kidney cancer that originates in the lining of the proximal convoluted tubule, the 2004 World Health Organization Classification of adult renal tumors stratifies RCC into several distinct histologic subtypes of which clear cell, papillary, and chromophobe tumors account for 70%, 10-15%, and 5%, respectively. RCC accounts for 90% of adult renal malignancies and is the most lethal of all urologic cancers.1-3 RCC is not a single entity but rather a heterogeneous group of neoplasms with varying histologic findings, cytogenetic abnormalities, biologic behavior, prognosis, and response to therapy.4-10 Chromosome 3p deletions are found in up to 96% of clear cell RCCs including somatic inactivating mutations of the von Hippel–Lindau (VHL) gene.1,11 Cyto genetic abnormalities are associated with the papillary subtype include trisomies of chromosomes 3, 7, 12, 16, 17, and 20, c-MET mutations, and loss of the Y chromosome.11,13,14 Cyto genetic abnormalities associated with chromophobe RCC include loss of multiple chromosomes such as 1, 2, 6, 10, 13, 17, and 21.15 The clear cell subtype shows a less favourable outcome compared with papillary and chromophobe subtypes, and is more likely to be symptomatic, present at an advanced stage, and show a
greater propensity to metastasize. The 5-year survival rate is 44-69% in clear cell tumors, 82-92% in papillary tumors, and 78-92% in chromophobe tumors. In advanced disease, a tailored management approach is recommended as the effectiveness of systemic therapy including the specific regime used may be influenced by the RCC subtype. Studies have suggested that clear cell, papillary, and chromophobe subtypes can be differentiated non-invasively on imaging. Studies have also found that RCCs that develop in patients with end-stage renal disease tend to be less aggressive than RCCs that occur in the general population. Hereditary RCCs account for 4% and show a predilection toward early onset, bilaterality, and multicentricity. Around 25-60% of VHL patients develop RCC with the risk of metastasis related to tumor size. Birt–Hogg–Dube (BHD) syndrome, an autosomal dominant condition caused by mutations in the folliculin gene, predisposes to cutaneous tumors, oncocytomas and clear cell, papillary, and chromophobe RCCs. Recently, it has been discovered that patients with hereditary succinate dehydrogenase mutations are at risk of developing aggressive early-onset RCCs in addition to pheochromocytomas and paragangliomas. Most RCCs are asymptomatic and discovered as unexpected findings on imaging performed for unrelated clinical indications. The classic triad of a palpable mass, flank pain, and hematuria is found in 6-10% and portends a more aggressive histology and advanced disease. Clear cell RCC typically shows a heterogeneous consistency (secondary to necrosis, cystic change, or hemorrhage) has high signal intensity on T2-weighted magnetic resonance imaging (MRI), and is hypervascular on dynamic contrast-enhanced (DCE) computed tomography or MRI examinations. Most papillary RCCs (PRCC) are detected while at a low grade and small size, show low signal intensity on T2-weighted MRI, and are hypovascular following contrast administration. Chromophobe RCCs may have a homogeneous solid appearance even when large and may exhibit a central stellate scar and spoke-wheel enhancement. Clear cell RCC typically exhibits exophytic growth and has a tendency to be heterogeneous due to intratumoral necrosis, cystic change, or hemorrhage. Interruption of the tumor capsule has also been correlated with high tumor grade. Cystic PRCCs may show hemorrhagic fluid content and internal mural nodules or papillary projections while cystic clear cell RCCs typically show clear fluid content and irregular walls and septations. Chromophobe RCC tends to appear well-circumscribed and homogeneous (cystic change and necrosis are uncommon) even when large and perinephric infiltration and vascular involvement (<4%) are rare. Most PRCCs demonstrate low T2 signal intensity. In contrast, most clear cell RCCs show high T2 signal intensity. Several preliminary studies have shown encouraging results in utilizing diffusion-weighted imaging (DWI) for characterizing RCCs into its main subtypes as well as into high-grade and low-grade tumors. DWI has been used to differentiate various subgroups of renal masses. MRI is also useful for imaging renal vein and IVC tumor thrombus and the rostral extension (important in pre-operative planning). The presence of enhancement in the thrombus is able to distinguish between bland and tumor thrombus.

**Fuhrman et al. Grading of RCC**

Specifically, grade I tumors consist of cells with small (approximately 10 mm), round, uniform nuclei with inconspicuous or absent nucleoli; grade II tumors have larger nuclei (approximately 15 mm) with irregular morphology and small nucleoli when examined under high power (400 magnification); grade III tumors have even larger nuclei (approximately 20 mm) with irregular outlines and large, prominent nucleoli that are evident even at low power (100 magnification); and grade IV tumors differ from grade III lesions in that they contain bizarre, multilobed nuclei, and heavy chromatin clumps.

The staging of RCC is the most important factor in predicting its prognosis. Staging can follow the TNM staging system, where the size and extent of the tumour (T), involvement of lymph nodes (N), and metastases (M) are classified separately. Furthermore, it can use overall stage grouping into stage I-IV, with the 1997 revision of AJCC described (Table 1).52

**Surgical and Further Management**

**Stage IA**

Partial nephrectomy is a widely accepted treatment for RCC tumors of <4 cm in diameter. Nephron-sparing partial nephrectomy - with the objective being the complete surgical extirpation of the tumor while retaining sufficient healthy tissue for adequate renal function - is the preferred treatment option for stage IA. Over the past decade, the clinical indications for partial nephrectomy have been expanded to include most patients with low-stage tumors as studies have demonstrated that partial nephrectomy is as effective a therapeutic option as radical nephrectomy with comparable rates of tumor-free survival and overall survival.

**Stage IB**

The NCCN recommends that either partial nephrectomy or radical nephrectomy be performed for stage IB tumors. Both techniques show comparable oncologic control.

**Stage II and III**

The NCCN recommends that radical nephrectomy be performed for stage II and III tumors. Routine adrenalectomy and lymphadenectomy is not advocated in
Table 1: Staging-based on TNM staging system

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>Tumor of a diameter of 7 cm (approx. 2 3⁄4 inches) or smaller, and limited to the kidney. No lymph node involvement or metastases to distant organs</td>
</tr>
<tr>
<td>Stage II</td>
<td>Tumor larger than 7.0 cm but still limited to the kidney. No lymph node involvement or metastases to distant organs</td>
</tr>
<tr>
<td>Stage III any of the following</td>
<td>Tumor of any size with the involvement of a nearby lymph node but no metastases to distant organs. Tumor of this stage may be with or without spread to fatty tissue around the kidney, with or without spread into the large veins leading from the kidney to the heart. Tumor with spread to fatty tissue around the kidney and/or spread into the large veins leading from the kidney to the heart, but without spread to any lymph nodes or other organs</td>
</tr>
<tr>
<td>Stage IV any of the following</td>
<td>Tumor that has spread directly through the fatty tissue and the fascia ligament-like tissue that surrounds the kidney. Involvement of more than one lymph node near the kidney. Involvement of any lymph node not near the kidney. Distant metastases, such as in the lungs, bone, or brain</td>
</tr>
</tbody>
</table>

the absence of radiologic disease at these sites as it does not improve survival. A laparoscopic approach is favored for stage II tumors while stage III tumors are usually treated by an open approach.45 (1) Baseline abdominal computed tomography (CT) or MRI within 3-6 months, then CT, MRI, or US every 3-6 months for at least 3 years and then annually up to 5 years, (2) baseline chest CT within 3-6 months after surgery with continued imaging (CT or chest X-ray) every 3-6 months for at least 3 years and then annually up to 5 years.

**Stage IV**

Renal cell cancers are typically treated with both local and systemic therapy. Local therapy consists of surgery to remove the entire affected kidney and any surrounding cancer. The surgery for Stage IV renal cell cancer is called a radical nephrectomy and involves removing the entire affected kidney, the attached adrenal gland, and any adjacent fat and involved lymph nodes or major blood vessels. Systemic therapy is directed at destroying cancer cells throughout the body and may include chemotherapy, targeted therapy, or immunotherapy. A randomized trial by Motzer et al. involving 750 patients with metastatic clear cell RCC showed that patients treated with sunitinib had longer progression free survival and overall survival compared with patients treated with interferon-1±. Several studies have suggested that vascular endothelial growth factor (VEGF)-TKIs may be less effective in treating papillary and chromophobe RCCs compared with clear cell RCCs.16,26,47-49 Potential agents include temsirolimus, sorafenib, sunitinib, pazopanib, axitinib, everolimus, bevacizumab, or erlotinib. Preliminary studies have suggested that temsirolimus has efficacy in treating PRCC. The NCCN guidelines for stage 4 patients are as follows:2 (1) Cases that involve a potentially resectable solitary metastatic site should undergo nephrectomy and surgical metastasectomy, (2) cases that involve a potentially resectable RCC with multiple metastatic sites should undergo cytoreductive nephrectomy in appropriate patients before systemic therapy, and (3) cases with medically or surgically unresectable disease should undergo systemic therapy.

The NCCN suggests that stage IV patients should undergo baseline chest, abdominal, and pelvic imaging by CT or MRI pre-treatment or before observation, followed by repeat imaging every 6-16 weeks as per physician discretion and per patient clinical status.22 The imaging frequency may be modified depending on the rate of disease change and the sites of active disease.22

**Aim**

The aim of this study was to correlate the histopathology of RCC with the radiological features.

**MATERIALS AND METHODS**

The total number of renal tumors studied during the 8-year period was 45 cases, of which 25 cases were diagnosed by histopathology as various types of RCC conclusively. This is a retrospective study of renal tumors, diagnosed by histopathology as various types of RCC. All the relevant clinical data of the patients were searched from the ward records. The various radiological features were collected. The clinical features examined included age, gender, smoking history, recent onset hypertension, performance status, and presenting symptoms. A comprehensive health checkup on general conditions were taken and stored in the computer server.

**RESULTS**

Clear cell carcinoma was the most reported case and 16 cases were reported, other tumors were papillary carcinoma and chromophobe carcinoma in the study covering 8-year period was 45 cases, of which 25 cases were diagnosed by histopathology as various types of RCC conclusively at Thoothukudi Medical College (Tables 2-5).
MRIT1 shows often heterogeneous due to necrosis, hemorrhage, and solid components T2 shows appearances depend on histology clear cell RCC with hyperintense signal and PRCC with hypointense signal. Histopathology section shows clear cell carcinoma with increased vascularity and clear cytoplasm with four grades of Fuhrman nuclei, PRCC showing papillary architecture and chromophobe renal carcinoma showing the neoplastic cells have a fine reticular cytoplasm and bland nuclei some of which have “raisinoid” appearance.

### Clear Cell RCC

Clear cell renal carcinoma is derived from the proximal convoluted tubule - frequency 60-70%. Most commonly affects male patients in their sixties and seventies. Microscopically, the tumor cells are large, the appearance of the cytoplasm ranging from optically clear, with sharply outlined boundaries. Clear cell renal carcinoma (conventional) arises from proximal convoluted tubules large uniform cells with clear cytoplasm highly vascular.

### Chromophobe renal carcinoma

RCC in the lower pole of left kidney. MRI scan shows low signal intensity in T1-weighted image in the tumor area

### Table 2: Histopathological subtypes of RCC and corresponding grades

<table>
<thead>
<tr>
<th>Grades</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear cell</td>
<td>10</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Papillary</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Chromophobe</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma

### Table 3: Histopathological age, sex, distribution, and signs and symptoms in the subtypes of RCC

<table>
<thead>
<tr>
<th>Tumor type</th>
<th>Age group</th>
<th>M: F ratio</th>
<th>Signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear cell carcinoma</td>
<td>Females range from 66 to 74 years of age and the age involved in male was 69-74 years</td>
<td>7:9</td>
<td>Ten patients had complaints of fever, hematuria, and flank pain. Two patients had hematuria. Four patients had incidental findings</td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>Females range from 60 to 74 years of age and the age involved in male was 64-75 years</td>
<td>3:3</td>
<td>Three patients had hematuria. Three patients had incidental findings</td>
</tr>
<tr>
<td>Chromophobe carcinoma</td>
<td>Females range from 62 to 70 years of age and the age involved in male was 75 years</td>
<td>2:1</td>
<td>Two patients had hematuria. One patient had incidental findings</td>
</tr>
</tbody>
</table>

### Table 4: Correlation study of RCC

<table>
<thead>
<tr>
<th>Tumor type</th>
<th>Radiographic findings</th>
<th>Histopathological Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear cell carcinoma</td>
<td>MRI scan shows heterogeneously enhancing mass at the upper pole of the right kidney with low T1 signal intensity after administration of contrast</td>
<td>Section studied shows clear cell carcinoma with increased vascularity and clear cytoplasm with features of Fuhrman grade 1 nuclei which are uniform, lack, or have inconspicuous nucleoli</td>
</tr>
<tr>
<td>Grade I</td>
<td>Renal cell cancer (RCC) lower pole of left kidney. Arterial (40 s) contrast-enhanced CT shows areas of tumor with low intake of contrast surrounded by areas of increased contrast uptake</td>
<td>Section studied shows clear cell carcinoma with features of tumor cells have mild nuclear pleomorphism with occasional small nucleoli and stippled chromatin typical of Fuhrman grade 2 nuclei</td>
</tr>
<tr>
<td>Grade II</td>
<td>An arterial phase CT will show enhancement of a tumor thrombus due to neovascularization of the tumour, as in this case</td>
<td>Section studied shows clear cell carcinoma with features of Fuhrman grade 3 nuclei, patchy, and show moderate pleomorphism and large nucleoli</td>
</tr>
<tr>
<td>Grade III</td>
<td>Left heterogenous enhancing mass in the mid-pole of the left kidney. This is well illustrated on this 4 phase renal angiogram CT study</td>
<td>The marked nuclear enlargement of grade 4 nuclei is obvious when compared to the scattered inflammatory cells. Prominent cherry-red nucleoli, with some nuclei harboring two or three nucleoli</td>
</tr>
<tr>
<td>Grade IV</td>
<td>A well-circumscribed, 31 mm diameter, lesion is identified along the superoposterior cortical pole of the right kidney. It extends deep toward the calyceal system</td>
<td>Section studied shows papillary carcinoma with features of numerous papillae. Note the nuclei are small, have open chromatin, and indistinct nucleoli typical of type 1 PRCC</td>
</tr>
<tr>
<td>PRCC</td>
<td>Left heterogenous enhancing mass in the mid-pole of the left kidney. This is well illustrated on this 4 phase renal angiogram CT study</td>
<td>Section studied shows papillary carcinoma a tumor composed of several tubulopapillary structures. There is nuclear enlargement and hyperchromasia, prominent nucleoli, and more abundant basophilic cytoplasm</td>
</tr>
<tr>
<td>Grade I</td>
<td>A well-circumscribed, 31 mm diameter, lesion is identified along the superoposterior cortical pole of the right kidney. It extends deep toward the calyceal system</td>
<td>Section studied shows papillary carcinoma a tumor composed of several tubulopapillary structures. There is nuclear enlargement and hyperchromasia, prominent nucleoli, and more abundant basophilic cytoplasm</td>
</tr>
<tr>
<td>Grade II</td>
<td>Left heterogenous enhancing mass in the mid-pole of the left kidney. This is well illustrated on this 4 phase renal angiogram CT study</td>
<td>Section studied shows papillary carcinoma a tumor composed of several tubulopapillary structures. There is nuclear enlargement and hyperchromasia, prominent nucleoli, and more abundant basophilic cytoplasm</td>
</tr>
<tr>
<td>Chromophobe carcinoma</td>
<td>RCC in the lower pole of left kidney. MRI scan shows low signal intensity in T1-weighted image in the tumor area</td>
<td>Section studied shows the neoplastic cells have a fine reticular cytoplasm and bland nuclei some of which have “raisinoid” appearance. The cells have distinct, thick nuclear membranes, and perinuclear halos</td>
</tr>
</tbody>
</table>
Based on nuclear features, these tumors are graded into four grades. Fuhrman grade 1 nuclei which are uniform, lack, or have inconspicuous nucleoli. The tumor cells have mild nuclear pleomorphism with occasional small nucleoli and stippled chromatin typical of Fuhrman grade 2 nuclei. Fuhrman grade 3 nuclei may be patchy, show moderate pleomorphism, and large nucleoli. The marked nuclear enlargement of grade 4 nuclei is obvious when compared to the scattered inflammatory cells. Prominent cherry-red nucleoli, with some nuclei harboring two or three nucleoli. Sixteen cases clear cell renal carcinoma of were reported. Nine cases involving females and seven case involving males. The age group involved in females range from 66 to 74 years of age and the age involved in male was 69-74 years.

**Clear Cell RCC**

The histopathology and radiology correlation was perfect in all the cases (Figures 1-8).

**PRCC**

Majority of tumors occur sporadically, but some may develop in members of families with hereditary. PRCC arises from distal convoluted tubules can be multifocal and bilateral most common form in dialysis-associated RCC type I is sporadic, generally good prognosis type II is inherited, bilateral, and multifocal. Microscopically, type I have papillae covered by a single layer of cuboidal or low columnar cells with scanty cytoplasm and low-grade nuclei and carry a better prognosis than type II tumors. Microscopically, type II are of a higher nuclear grade and contain more than one layer of cells with abundant eosinophilic cytoplasm. Six cases papillary cell renal carcinoma of were reported. Three cases involving females and three case involving males. The age group involved in females range from 60 to 74 years of age and the age involved in male was 64-74 years.

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Table 5: Final outcome of the study

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Surgery done</th>
<th>Cure rate measured after 3 years (%)</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear cell renal carcinoma</td>
<td>Ten cases were stage I. Four cases were stage II. Two cases were stage III. Partial nephrectomy was done treatment for RCC tumors of&lt;4 cm in diameter. Partial nephrectomy or radical nephrectomy was done for stage IB tumors. Radical nephrectomy be performed for stage II and III tumors</td>
<td>75</td>
<td>Eleven cases attend regular follow-up. One case died of multiple organ failure</td>
</tr>
<tr>
<td>PRCC</td>
<td>Three cases were stage I. Two cases were stage II. One case was in stage III. Partial nephrectomy was done treatment for RCC tumors of&lt;4 cm in diameter. Partial nephrectomy or radical nephrectomy was done for stage IB tumors. Radical nephrectomy be performed for stage II and III tumors</td>
<td>50</td>
<td>Three cases are attending the follow-up</td>
</tr>
<tr>
<td>Chromophobe RCC</td>
<td>One case were stage I. Two cases were stage II. Partial nephrectomy was done treatment for RCC tumors of less than 4 cm in diameter. Radical nephrectomy was done for stage IB tumors. Radical nephrectomy be performed for stage II</td>
<td>66</td>
<td>Two cases are attending the follow-up</td>
</tr>
</tbody>
</table>

---

**Figure 1:** CT scan shows heterogeneously enhancing mass at the upper pole of the right kidney after administration of contrast.

**Figure 2:** Section studied shows small uniform nuclei with evenly distributed chromatin and the absence of nucleoli, all of which are features of Fuhrman grade 1 nuclei.
Figure 3: Renal cell cancer (RCC) lower pole of left kidney. Arterial (40sec) contrast enhanced phase.

Figure 4: Section studied shows clear cell carcinoma with features of Fuhrman grade 2 nuclei typical of stippled chromatin.

Figure 5: An arterial phase CT will show enhancement of a tumour thrombus due to neovascularisation of the tumour, as in this case.

Figure 6: Section studied shows clear cell carcinoma with features of Fuhrman grade 3 nuclei, patchy, and show moderate pleomorphism and large nucleoli.

Figure 7: Left heterogenous enhancing mass in the mid-pole of the left kidney. This is well illustrated on this 4 phase renal angiogram CT study.

Figure 8: The marked nuclear enlargement of grade 4 nuclei is obviously seen. Prominent cherry-red nucleoli, with some nuclei harbouring two or three nucleoli.
PRCC, Type 1
The histopathology and radiology correlation was perfect in all the cases (Figures 9 and 10).

RCC (Type II Papillary)
The histopathology and radiology correlation was perfect in all the cases (Figures 11 and 12).

Chromophobe RCC: The frequency of incidence among overall RCC is chromophobe is derived from the cortical collecting duct. Chromophobe RCC has a much better prognosis than clear cell and PRCC, with 5-year survival rate of >90%. Most cases arise sporadically, whereas some familial cases are associated with BHD syndrome. Microscopically, the neoplastic cells have a fine reticular cytoplasm and bland nuclei some of which have “raisinoid” appearance. The cells have distinct, thick nuclear membranes, and perinuclear halos. Some cells have no nuclei in the plane of section due to the voluminous cytoplasm. This RCC arises from intercalated cells of collecting ducts, similar histologically to renal oncocyotos best prognosis. Three cases were reported. The age group involved in two females range from 62 to 70 years and the age involved in male was 75 years.

The histopathology and radiology correlation was perfect in all the cases (Figures 13 and 14).

Metastatic RCC
The most common sites for metastasis are the lymph nodes, lung, bones, liver, and brain. Average survival time in 2008 for the metastatic form of the disease was under a year and by 2013, this improved to an average of 22 months. From 2007 to 2013, seven
Kannan and Revathi: Radiology-pathological Correlation of Renal Cell Carcinoma

Baseline abdominal CT or MRI within 3-6 months, then CT, MRI, or US every 3-6 months for at least 3 years and then annually up to 5 years; baseline chest CT within 3-6 months after surgery with continued imaging (CT or chest X-ray) every 3-6 months for at least 3 years and then annually up to 5 years.

**DISCUSSION**

RCC, in our study, the common subtypes were clear cell RCC, PRCC, and chromophobe RCC were the common subtypes observed. The PRCC and chromophobe RCC responded moderately to the treatment. The total cases reported in the department are 25 cases out of which 16 cases are attending follow-up after 3 years. The clear cell renal carcinoma did not respond to treatment to the expected mark. RCC is not a single uniform entity but a group of related neoplasms in which the histologic findings, cytogenetic abnormalities, biologic behavior, and imaging appearances of the tumors are subtype dependent. The 3 main subtypes - clear cell, papillary, and chromophobe - can often be differentiated non-invasively based on characteristic radiologic appearances. Based on the hypothesis that the diffusion of water to and from the cells is highly dependent on the ratio of intracellular and extracellular space, DWI MRI scan is used to differentiate the tumor grades. Organ-sparing treatment can be entertained in selected cases. This ranges from adrenal sparing nephrectomy to partial nephrectomy, performed both open or laparoscopically. In addition, percutaneous radiofrequency or cryoablation (typically under CT guidance), which can be carried out with only local anesthetic and sedation, has been introduced in selected cases. Avastin is a targeted therapy that blocks a protein known as VEGF. Votrient is a targeted oral medication known as an angiogenesis inhibitor. Sutent is an oral multitargeted tyrosine kinase inhibitor that targets proteins responsible for stimulating cancer cell growth. 5-fluorouracil appears to be the most effective chemotherapeutic agent currently available for kidney cancer.

**CONCLUSION**

Imaging remains the primary tool for the detection and screening of RCC. Perfusion MRI and diffusion MRI play important roles in tumor characterization, prediction, and early detection of therapeutic response and used to differentiate the histology of renal masses in some new treatments have been approved specifically for metastatic RCC (sunitinib, temsirolimus, bevacizumab, sorafenib, everolimus, pazopanib, and axitinib). These new treatments are based on the fact that RCCs are very vascular tumors - they contain a large number of blood vessels. The drugs aim to inhibit the growth of new blood vessels in the tumors, hence slowing growth and in some cases reducing the size of the tumors. Paraneoplastic syndromes are seen in about 25% of RCC patients will develop a paraneoplastic syndrome. They are hypercalcemia (20%), hypertension (20%), and polycythemia: From erythropoietin secretion (~5%), Stauffer Syndrome: Hepatic dysfunction not related to metastases, feminization, and limbic encephalitis.

The prognosis is influenced by several factors, including tumor size, degree of invasion and metastasis, histologic type, and nuclear grade. The PRCC and chromophobe RCC responded moderately to the treatment. The clear cell renal carcinoma did not respond to treatment to the expected mark.
preliminary studies. DCE and perfusion MRI can also be used to estimate the morphologic grading of RCC. Histopathology provided the final diagnosis. The prognostic significance of tumor necrosis in clear cell RCC has been confirmed by other groups. More aggressive RCC tumors, which are likely to exhibit necrosis, also harbor increased numbers of tumor-infiltrating T-cells. Tumor necrosis has garnered increasing attention over the past few years, in part because a number of studies have now shown that tumor necrotic tissues can be successfully targeted to facilitate both external tumor imaging and to foster a therapeutic antitumor response by the host. Coagulative tumor necrosis represents a significant prognostic marker for clear cell and chromophobe RCC. The landscape for RCC treatment has changed dramatically in recent years, with the addition of three new FDA-approved agents this year. This brings our arsenal to seven drugs: Interleukin-2, the VEGF receptor TKI’s sunitinib, sorafenib, and pazopanib, the VEGF neutralizing antibody bevacizumab in combination with interferon, and the mTOR inhibitors temsirolimus and everolimus. Pre-operative radiological classification can be used as a supplement to the histopathological grading. This study provides the importance of other medical faculcy the surgeon, radiologist, and oncologist to work as a team for a successful outcome. We correlated the histopathological findings with radiological findings. This resulted in perfect correlation between the histopathology study and radiology study.

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Open Fractures and Incidence of Infection in Tertiary Care Government Hospital

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Abstract

Introduction: Infection still represents one of the most common challenge in the treatment of open fractures. It is well known that most infections in open fractures are of nosocomial origin as causative microorganisms of infection are different to those found in initial smears. This study was aimed to highlight incidence of infection, its microbial trend during treatment.

Materials and Methods: This retrospective observational study was conducted from January 2017 to April 2017 at Department of Orthopedics, B. J. Medical College and Sassoon General Hospital, Pune, Maharashtra. Records of total 60 patients with 64 open fractures treated under our hospital’s Orthopedic Department were analyzed.

Results: Among the 60 patients with 64 open fractures, there were 15 (23.43%) cases of infection overall. Road traffic accident predominated 48 (75%) as mode of injury. There was change in wound flora over the period of hospital stay. Mean duration of final wound coverage was 5.66 days. Rate of infection increased with increase in trauma to final wound coverage interval.

Conclusion: Most infections in open fractures are nosocomial in origin and the wound flora changes during the hospitalization period. Chances of infection of wound increases as there is increase in trauma to final wound coverage interval.

Key words: Incidence, Infection, Microbial trend, Open fractures

INTRODUCTION

An open fractures still represent a major challenge for the treating surgeon and frequently demands an array of complex procedures to achieve an undisturbed healing with adequate limb function. The incidence of infection in open fractures varies considerably in the literature. Spencer et al.¹ showed overall incidence of infection in open fractures to be about 10.4% whereas Weitz-Marshall and Bosse² found infection rates between 0% and 50%.

Radical (repetitive) debridement of the wound and coverage of soft tissue defects along with antibiotic therapy are of utmost importance in the prophylaxis of septic complications. Rates of primary colonization of a contaminated wound have been shown to as high as 70%.³,⁴ It is well known that most infections in open fractures are of nosocomial origin as causative microorganisms of infection are different to those found in initial smears.⁵,⁶ If the local wound requires flap coverage, early performed procedures yield a clear decrease of infection rates even in most severe fracture forms.

In the present study, we analyzed the incidence of infection and its microbial trend in cases of open fracture at a tertiary care government hospital.

Aims and Objectives

1. To determine the incidence of infection in open fractures
2. To determine whether there is change in flora of wound due to delayed wound coverage in cases of open fractures.
MATERIALS AND METHODS

Sixty patients with 64 open fractures aged between 18 and 60 years presenting to our tertiary hospital were considered. Patients having life-threatening head, abdominal or chest injuries, those with mental illness, burns and/or systemic illnesses, and/or immunocompromized status were excluded from the study. Patients who later died because of trauma or who had indication for immediate amputation were also excluded from study.

As per record, wound evaluation and grading of fracture were done according to Gustilo and Anderson Classification.

Gustilo and Anderson\textsuperscript{6-9} classified open fractures into three categories (Table 1).

As per record, treatment for management of open fractures as per our departmental protocol was followed as mentioned below:

Wound was irrigated in the emergency department. Wound swab was taken for culture and sensitivity after surface cleaning and was repeated at 1-week interval except when definitive wound closure was done. Intravenous (IV) broad spectrum antibiotics were given in the form of injection amoxicillin + clavulanic acid 1.2 g BD, injection amikacin 500 mg OD, injection metronidazole 500 mg TDS for minimum of 5 days after surgical debridement. Intraoperative wound debridement was done within 6 h of presentation to hospital and irrigation with 3 liters of saline per Gustilo grade. Primary wound closure was done if wound permitted so. Secondary wound closure was done in cases of heavily contaminated wound. In case of delayed wound closure or wound coverage because of burden of patients in government hospital, wound dressing was done after every 48 h. For larger defects, either skin grafting or flap coverage for wound was done as early as possible. Fixation comprising of either internal fixation and external fixation or cast immobilization was done. Analgesics and IV fluids were given on as and when required basis.

Infection was documented irrespective of the type of closure or fixation and irrespective of culture results. The spectrum of infection included those wounds with either cellulitis, wound breakdown, stitch abscess, purulent discharge or ooze, established collection or abscess and or those with infected metalware where applicable.

Data were obtained from patient’s record with regard to age, sex, mode of injury, and time interval between trauma and presentation to casualty, fracture site, grading of open fracture, associated medical comorbidities, culture, and sensitivity report as well as time interval between trauma and final wound coverage. The data were analyzed.

RESULTS

During the study, after considering the inclusion and exclusion criteria, hospital record of 60 patients with 64 open fractures who were treated under Department of Orthopedics of Sassoon General Hospital, Pune was analyzed.

The mean age of patients was 38.69 years old (range 18-60 years). Of these, 53 (88.33%) were male, and seven (11.67%) were females (Figure 1).

Among the mode of injury (Figure 2), road traffic accident predominated as the cause for open fracture involving 48 (75%) patients. Other modes were crush injury (10.93%), fall from height (6.25%), physical assault (6.25%), and sports injury (1.56%).

Most common site of open fracture (Figure 3) was tibia (40.62%), followed by femur (21.87%), radius/ulna (15.62%), ankle (12.5%), hand (4.68%), and foot (4.68%).

<table>
<thead>
<tr>
<th>Table 1: Gustilo and Anderson Classification of open fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feature</strong></td>
</tr>
<tr>
<td>Wound size, cm</td>
</tr>
<tr>
<td>Energy</td>
</tr>
<tr>
<td>Contamination</td>
</tr>
<tr>
<td>Deep soft tissue damage</td>
</tr>
<tr>
<td>Fracture comminution</td>
</tr>
<tr>
<td>Periosteal stripping</td>
</tr>
<tr>
<td>Local coverage</td>
</tr>
<tr>
<td>Neurovascular injury</td>
</tr>
<tr>
<td>Infection rate</td>
</tr>
</tbody>
</table>
Distributing the fractures according to Gustilo and Anderson Classification (Figure 4), nine fractures (14.06%) were Grade I, 24 fractures (37.5%) were Grade II, and 31 fractures (48.43%) were Grade III.

There were 15 (23.43%) cases of infection overall. Among them, one fracture (6.66%) was Grade I, two (13.33%) were Grade II, and 12 (80%) were Grade III. Analysing the proportion of infected open fractures, Grade III B fractures predominated with 46.66%. This shows that the incidence of infection in open fracture increased with increase in Gustilo and Anderson grade of the fracture (Figure 5).

Analysing the culture and sensitivity report of the wound swabs (Table 2), *Acinetobacter* species (nine samples positive - 14.06%) and *Enterobacter* species (nine samples positive - 14.06%) were the most common bacteria detected in wound swabs taken in casualty.

Methicillin-resistant *Staphylococcus aureus* (MRSA) (three samples positive - 8.33%) and methicillin-sensitive *S. aureus* (three samples positive - 8.33%) were the most common overall organism detected in wound swabs taken at 1 week after trauma.

All the wounds which developed infection before final wound coverage showed change in wound flora during hospitalization.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Casualty</th>
<th>1 week</th>
<th>2 weeks</th>
<th>3 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No growth</td>
<td>34</td>
<td>19</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td><em>Enterobacter</em> spp.</td>
<td>9</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Acinetobacter</em> spp.</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td><em>Enterococcus</em> spp.</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td><em>Citrobacter</em> spp.</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><em>Streptococcus</em> spp.</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>E. coli</em></td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>MRSA</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>MSSA</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Pseudomonas</em> spp.</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>P. vulgaris</em></td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td><em>P. mirabilis</em></td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>K. pneumoniae</em></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The mean duration from time of trauma to final wound coverage was 5.66 days (range 2 h to 21 days).

Time interval between trauma and final wound coverage affected the incidence of infection in the wound. The incidence of infection increased with increase in this interval. Among the 35 fractures which had final wound coverage within 1 week of trauma, only four (11.42%) developed infection. Of the 20 fractures which received final wound coverage between 1 and 2 weeks of trauma, four (20%) developed infection in the wound. Nine fractures which received final wound coverage beyond 2 weeks of trauma, seven (77.77%) developed infection. This shows that those fractures which received final wound coverage within 2 weeks after trauma had less chance of developing infection (Figure 6).

**DISCUSSION**

Infection still represents one of the most common challenge in treatment of open fractures. Breakdown of tissue barrier between the fracture and environment creates portal for contaminating agents. The incidence of infection in open fractures varies considerably in the literature. Spencer et al.\(^1\) showed overall incidence of infection in open fractures to be about 10.4%. Muhr and Ostermann\(^10\) reported the risk of infection between 0% and 25% whereas Weitz-Marshall and Bosse\(^2\) found infection rates between 0% and 50%. In our study, we found overall incidence of infection of 23.43%.

As a result of improved aseptic precautions and operative techniques, outcomes in open fracture patients have improved but loss of injured extremity because of wound complications still remains a major concern. Open fractures are more prone to complications of wound infection despite improved patient survival and limb salvage.

Rates of primary colonization of a contaminated wound have been shown to as high as 70%\(^3\). Smears reveal most often Gram-positive *S. aureus* and *Epidermidis* and in Gram-negative species Bacilli, *Pseudomonas, Acinetobacter*, or *Enterobacterae*\(^7\)-\(^9\),\(^11\)-\(^14\). In our study, rate of primary colonization was 46.87%. The most common primary colonizing agent was *Enterobacter* species and *Enterococcus* species. Whereas MRSA was the most common bacteria causing infection in open fractures. By showing similar findings, our study further strengthens those international studies.

Although the microbiological pattern at the wound site may be influenced by environmental factors (agricultural injury, gunshot injury, and water injury…) which have to be considered in the antibiotic management\(^4\),\(^15\),\(^16\). It is well known that most infections in open fractures are of nosocomial origin as causative microorganisms of infection are different to those found in initial smears\(^7,8\). Lee\(^7\) evaluated that only 8% of microorganisms on pre-debridement cultures were to be the infectious agents. Our study also showed that all the infected wounds showed change in flora during hospitalization. This further strengthens the fact that most infections in open fractures are nosocomial in origin.

Our study supported the importance of early wound coverage as those fractures which received wound coverage after 2 weeks of trauma, 77.77% developed infection before final wound coverage.

Limitations of our study are those inherent to all designs that use data collected from medical records, such as reliability and incompleteness of information.

**CONCLUSION**

Most of the open fracture wounds show change in wound flora during hospitalization and the infection in
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open fracture wounds is most often nosocomial in origin. The rate of infection in wound increases with increase in trauma to final wound coverage interval. We recommend final wound coverage as early as possible. We would like to conduct further study to access whether change in the dressing material and current practice of dressing will affect the outcome of these difficult to treat compound fracture.

REFERENCES


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Treatment Requirement and Gingival Status among the Pediatric Patients Visiting

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INTRODUCTION

Periodontitis is the most common chronic diseases in adults; it is bacterially mediated inflammation that extends deep into the tissues, causing loss of supporting connective tissue, and alveolar bone.¹

As the prevalence and severity of periodontal diseases are high among population, prevention, and treatment of these diseases are one of the most serious problems of the modern dentistry.²

The Community Periodontal Index of Treatment Needs (CPITN) index has developed jointly by the International Dental Federation (IDF) and the World Health Organization (WHO) to evaluate periodontal status and treatment needs of population.³ ⁴

MATERIALS AND METHODS

The participants of the study were aged between 13 and 14 years from the patients visiting Department of Pedodontics, Government Dental College, Jammu, India. A single dentist trained for the specific study conducted the Clinical examination under daylight using mouth mirrors and CPITN probes (designed by the WHO/IDF), with applying a gentle probing force (20 g or lower) according to the WHO criteria. The severity of the gingival disease were evaluated and documented according to gender, frequency of dental brushing, plaque index, and CPITN.

Results: In 200 participants of 13-14 years of age, 100 (50.0%) were males, and 100 (50%) were females. The CPITN index (Code 0) 66.0% was most prevalent followed by (Code 1) 22.0%, (Code 2) 9.0%, and (Code 3) 3.0%.

Conclusions: Female participants were found to have higher gingival status (Code 0) as compared to males. Poorer periodontal health status in some participants had been related to poor plaque score and low brushing frequency.

Key words: Community periodontal index of treatment needs, Gingiva, Pediatric
given a grade and registered according to the highest recorded at the index teeth.

Each sextant was designated as healthy when no treatment is required (Code 0 = TN0), or X (missing). In case of bleeding without calculus, it was recommended to improve oral hygiene (Code 1 = TN1). If calculus but no periodontal pockets were detected, oral hygiene instructions were provided and professional cleaning was carried out, if indicated (Code 2 = TN2). The presence of 4-5 mm pockets (Code 3), and 6 mm or deeper (Code 4) may or may not need treatment by deep scaling. In such a condition, root planning, and more complex surgical procedures may be indicated. The severity and prevalence of the periodontal diseases, as well as its frequency distribution were evaluated and reported according to gender, frequency of dental brushing, plaque index, smoking, and CPITN.

Chi-square test was conducted to determine the CPITN index in relation to gender, frequency of dental brushing, plaque index, and smoking status.

**RESULTS**

Table 1 demonstrates the distribution of samples in relation to gender. In the present study, out of total number of 200 participants of age 13-14 years, 100 (50.0%) were males, and 100 (50.0%) were females.

Table 2 demonstrates the distribution of brushing status in relation to gender. In the present study 122 (61.0%) of the participants brushes once and 78 (39%) of the participants brushes twice. The frequency of brushing was found to be higher in females as compared to males.

Table 3 demonstrates the distribution of participants according to their periodontal treatment needs in relation to gender. No significant difference was found in the type of periodontal treatment needs in terms of gender. In the present study, 86 (43.0%) of the participants had no signs periodontal disease (Code 0), 74 (37.0%) of the participants presented gingival bleeding after probing (Code 1) which required just oral hygiene instruction, 24 (12.0%) had supragingival calculus (Code 2), and 16 (8.0%) presented pockets of 4-5 mm which required removal of supra or subgingival calculus.

Table 4 demonstrates the distribution of participants according to plaque index score in relation to gender. In the present study, 88 (44.0%) had a good plaque score, (46.0%) had a fair plaque score, and 20 (10.0%) had a poor plaque score. The females show statistically significant \( P = 0.000 \) higher healthy periodontal status than males. It was observed that the participants with lower plaque score had healthier periodontal tissues than participants with fair or higher plaque score.

**DISCUSSION**

Periodontal diseases are the diseases that involve the periodontal structures beyond the gingiva and lead to loss of connective tissue attachment.\(^2\) Periodontal diseases are among the most widespread diseases in mankind.\(^3\) The oral cavity is not a sterile cavity. There are more than 500 bacterial species that are capable of colonizing in the oral cavity, and while about 150 species can be found in one individual, a number of these species are more associated with periodontal diseases than others.\(^4\) Periodontal diseases are caused not by a single oral microorganism but by several and the list is still being refined due to the complexity of

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**Table 1: Distribution of samples in relation to gender**

<table>
<thead>
<tr>
<th></th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 (50)</td>
<td>100 (50)</td>
<td>200 (100)</td>
</tr>
</tbody>
</table>

**Table 2: Distribution of brushing status in relation to gender**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once</td>
<td>69 (69)</td>
<td>53 (53)</td>
<td>122 (61)</td>
</tr>
<tr>
<td>Twice</td>
<td>31 (31)</td>
<td>47 (47)</td>
<td>78 (39)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (50)</td>
<td>100 (50)</td>
<td>200 (100)</td>
</tr>
</tbody>
</table>

**Table 3: Distribution of participants according to their periodontal treatment needs in relation to gender**

<table>
<thead>
<tr>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Code 0</td>
<td>32 (16)</td>
<td>48 (24)</td>
<td>80 (40)</td>
<td>Code 1</td>
<td>48 (24)</td>
<td>13 (6.5)</td>
<td>61 (30.5)</td>
<td>Code 2</td>
<td>11 (5.5)</td>
</tr>
<tr>
<td>Code 3</td>
<td>7 (3.5)</td>
<td>100 (50)</td>
<td>100 (50)</td>
<td>Total</td>
<td>86 (43)</td>
<td>74 (37)</td>
<td>162 (81)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-square=12.585, df=8 and \( P=0.12 \)

**Table 4: Distribution of participants according to plaque index score in relation to gender**

<table>
<thead>
<tr>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
<th>Code</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Good</td>
<td>17 (8.5)</td>
<td>71 (35.5)</td>
<td>88 (44)</td>
<td>Fair</td>
<td>64 (32)</td>
<td>28 (14)</td>
<td>92 (46)</td>
<td>Poor</td>
<td>19 (9.5)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (50)</td>
<td>100 (50)</td>
<td>200 (100)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-square=63.42, df=6, \( P=0.000 \)
the matter. Some of the microorganisms are considered to be more pathogenic than others.

The CPITN was endorsed by the WHO for population-based surveys in the 1980s. Although it has limitations, CPITN reflects unmet treatment needs and can give a fair assessment of the periodontal condition. It was used in this study because it has proved to be a simple and effective method for measuring and monitoring the severity of periodontal disease at the community level.\(^{15}\)

The CPITN was adopted by the WHO and FDI has been used in many studies as a basic epidemiological tool for the assessment of the nature and magnitude of the need for periodontal treatment and as an aid for planning public dental services. It was used in this study because it has proved simple and effective method for measuring and monitoring the severity of periodontal diseases. The results of CPITN have shown that healthy sextants (Code 0) were found to be more frequent in females than males (\(P<0.00\)). This is in accordance with a study carried out in Iran by Ashraf and Alireza\(^{3}\) the reason why gender affects periodontal health status may be attributed to the habit and conscious of females in doing a better oral hygiene practice.

This study also revealed that (Code 1) was found to be more frequent in males than in females. Various factors such as altered host response changes in oral microflora may probably contribute to more severe forms of periodontal disease.\(^{11}\)

**CONCLUSION**

There is a significant need for oral hygiene instructions and professional cleaning. There is a need for oral health education among this subpopulation of children and care givers; and provision of accessible, affordable, and regular use of oral health services to help meet their treatment needs. CPITN is a simple and quick screening tool for use in general dental practice which assists in assessing the goals of the treatment and time and cost estimation.

**REFERENCES**

Influence of Pre-operative Cognitive Status on Propofol Requirement to Maintain Hypnosis in the Elderly: A Study of 50 Cases

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Abstract

Introduction: In elderly patients decrease in cognitive function after anesthesia has been reported in the literature for over a century. Various studies have implicated agents such as propofol and sevoflurane in the development of post-operative cognitive dysfunction. We evaluated the effect of pre-operative cognitive status by mini-mental state examination (MMSE), on consumption of propofol during anesthesia in the elderly.

Materials and Methods: In this prospective observational study, we included 50 patients (65-99 years) undergoing elective abdominal surgeries under general anesthesia. Propofol infusion was adjusted to the bispectral index (BIS) and was maintained within 40-60. Multiple linear regression analysis determined if body mass index (BMI), age, baseline BIS, gender, and pre-operative MMSE score were related to the consumption of propofol.

Observation: MMSE and BMI scores were significantly related to the mean value of consumption of propofol. A decrease in propofol requirement in patients >65 years of age was associated with a low MMSE score. Effect of age, gender, and baseline BIS on the propofol consumption was insignificant.

Conclusion: To maintain hypnosis propofol requirement during general anesthesia appears to decrease with deterioration in the cognitive status in elderly patients. Cerebral cholinergic dysfunction associated with cognitive dysfunction may influence propofol sensitivity in aged patients.

Key words: Cognition, General anesthesia, Mini-mental state examination, Propofol requirement

INTRODUCTION

In elderly patients decrease in cognitive function after anesthesia has been reported in the literature for over a century, there is still a lack of consensus as to whether anesthetic agents may directly cause permanent cognitive loss. The general concern has been that while the potential neurotoxicity of anesthetics may be well tolerated by younger persons, age-related losses in cerebral reserve, increased permeability of the blood–brain barrier and slower drug elimination rates may lead to adverse effects and perhaps also precipitate neurodegenerative disorders.

The causes of prolonged recovery of cognition and memory after anesthesia and surgery are multifactorial. Various studies have implicated agents such as propofol and sevoflurane in the development of post-operative cognitive dysfunction. Agents such as propofol, sevoflurane, nitrous oxide (N₂O), midazolam, and fentanyl act on various types of receptors in the brain and these, in turn, may lead to cognitive dysfunction. The Folstein test or mini-mental state examination (MMSE) is a 30-point questionnaire test which is useful for screening briefly for impairment. MMSE is generally used for screening dementia in medicine. It is used in estimating the severity of impairment of cognition and following the changing course in cognition in an individual over time, thus making it an efficient way for documenting the treatment response in each individual. In this study, we evaluated the influence

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of pre-operative cognitive status using MMSE on propofol requirement to maintain hypnosis in the elderly and evaluated the influence of propofol on cognitive status.

MATERIALS AND METHODS

After obtaining individual informed consent and approval from the Ethical Committee 50 patients under ASA II and III, in the age group of 65-99 years, undergoing elective abdominal surgery under general anesthesia were included in this prospective, observational study. In this patient with ASA IV, increased levels of anxiety preoperatively (Hamilton Anxiety Scale [HAMA] >23), increased levels pain preoperatively (visual analogue scale > 4), severe impairment in cognition without responses to pain and anxiety score assessment and patients taking anticholinergic drugs were excluded in this study.

Assessment of the cognitive performance of patients was done using MMSE. The MMSE is a tool for screening cognitive performance, particularly in the elderly patients. The MMSE includes an instructions list, that examines: “Orientation in space (five points) and time (five points), registration (three points) and recall of words (short-term memory, three words), attention or calculation (five points), language naming (two points), repetition of a sentence (one point), following a three-stage command (three points), reading (one point), writing (one point), and copying a visual construction (one point). The maximum MMSE score is 30. Poor cognitive performance was defined by MMSE total score of 23 or less. The HAMA is a rating scale for quantifying severity of anxiety and is mostly used in evaluating patients under psychotropic drugs. It consists of 14 items, each defined by a series of symptoms. Each item is rated on a five-point scale, ranging from 0 (not present) to 4 (severe). If the total score is 17 or less, the anxiety is deemed to be mild; in the range of 18-23, the person is deemed to have a mild-to-moderate anxiety, and a score of 25 indicates a severe anxiety. The Hamilton anxiety scale, MMSE score, and the visual analogue pain score were obtained during pre-operative assessment just before surgery. The MMSE score is measured preoperatively and postoperatively after 1 h.

Anesthetic management was standardized in all patients. Premedication was not given to any patient. An 18 G catheter was inserted in a forearm vein for fluid and drug administration. Monitoring with non-invasive blood pressure (BP), electrocardiogram, saturation of oxygen (SpO₂), end-tidal CO₂, and bispectral (BIS) (intraoperatively) were instituted during the procedure.

Infusion pump for propofol was kept ready. Anesthesia machine (dragger work station) was checked, and all emergency drugs kept ready. All patients were premedicated with glycopyrrolate 0.2 mg IM, 15-30 min before surgery. All patients were preoxygenated with 100% oxygen and induced with fentanyl 2 mcg/kg and propofol 2 mg/kg or till BIS drops to 40 and intubation facilitated with suxamethonium 2 mg/kg intubation done with ET tube size 8-8.5 mm for men and 7-7.5 mm for women. Anesthesia maintained with atracurium 0.5 mg/kg as loading dose followed by 0.1 mg/kg as maintenance dose every 20 min.

Following intubation anesthesia was maintained with N₂O:O₂: 3:2 and propofol infusion at a rate of 120 mcg/kg/min for the first 10 min and then titrated according to the BIS value to be kept between 40 and 60. The patient was put on ventilator volume controlled mode with tidal volume 7-10 ml/kg, respiratory rate - 12-16 according to end-tidal CO₂, positive end-expiratory pressure - 3-5 cm H₂O. Additional doses of Fentanyl given whenever the pulse rate or BP was 20% above the baseline with BIS between 40 and 60. Propofol infusion was decreased by 10 mcg/kg/min every 10 min. If the BIS value exceeds 60, propofol infusion was increased by 10 mcg/kg/min and maintained at that rate for the next 10 min.

The demographic parameters such as age, sex, weight (kg), and ASA classification II/III were recorded. Patient pulse rate, BP, SpO₂, and body mass index (BMI) were recorded. The study parameters such as Hamilton anxiety rating scale, MMSE score (pre-operative and post-operative at 1 h), and baseline BIS and BIS at extubation, total dose of propofol administered (mg), and total time of administration of propofol (min) were recorded. The total duration of anesthesia and complications of anesthesia during the procedure were noted.

RESULTS

A total of 50 patients were enrolled in this study. The demographic details of the patients such as age, sex, weight, and height were recorded (Table 1). The pre-operative and post-operative MMSE score, HAMA score, baseline BIS and post-operative BIS, propofol dose, infusion rate, and total consumption were recorded. The mean MMSE score was 24 before surgery, and the mean HAMA total score was 6 that reflects no or mild anxiety in the patients. The pre-operative MMSE score was 24.52 ± 2.08 and post-operative MMSE score was 23.88 ± 1.77, and there was no difference between pre-operative and post-operative MMSE score (P > 0.101). The mean propofol total dose administered and the mean propofol administration duration were 246.2 (±44.3) mg and 80.2 (±29.3) min, respectively (Table 2).
The linear regression values between age and propofol consumption, BMI and propofol consumption, baseline BIS and propofol consumption and pre-operative MMSE, and propofol consumption were calculated. The correlation coefficient between BMI and propofol consumption and pre-operative MMSE and propofol consumption show moderate and high correlation, respectively (Table 3).

**DISCUSSION**

MMSE is a quick and simple test for roughly assessing the status of cognition and for classifying elderly patients as "no cognitive impairment (score range, 24-30), mild cognitive impairment (18-23), and severe cognitive impairment (below 18)." In this study, we evaluated the requirement of propofol in relation to MMSE score in the elderly patients. We have done multivariate analysis of the five factors that might potentially affect requirements of propofol. BMI and the MMSE score is related to the mean propofol dose per unit body weight per minute and also other variables such as age and gender versus propofol consumption. It was observed that the consumption of propofol during propofol infusion in maintenance of anesthesia was dependent on BMI. No significant effect of age and gender on propofol consumption was observed. The level of pre-operative cognitive status as assessed by the MMSE is revealed as on more factor by adjusting the infusion of propofol to the target anesthetic depth by assessing BIS monitor to maintain hypnosis in patients older than 65 years. MMSE score is affected by age in large epidemiological studies. However, it is considered to be a codependent variable which reflects more specifically the ageing of brain. However, our results clearly showed that the mean propofol consumption was related to the pre-operative MMSE score, in addition to BMI.

From our study, we cannot conclude if the relationship between requirement of propofol and MMSE score is because of differences in pharmacodynamics or pharmacokinetics, as we were not measured propofol concentrations. A previous study by Schliebs and Arendt has noted that a correlation exists between the MMSE score and the extent of the loss of cholinergic neurons in the basal forebrain in normal and pathological ageing in humans. Thus, the MMSE score appears to reflect the cerebral cholinergic dysfunction sustaining cognitive impairment. Propofol has an inhibitory effect on acetylcholine release, in a dose-dependent manner (more pronounced with a higher dose of propofol), in rodents. We suggest that a cognitive dysfunction linked to a cerebral cholinergic dysfunction might have influenced the brain pharmacodynamics of propofol in this study. It is reasonable to suggest that less propofol may be needed in the presence of cognitive dysfunction. Thereby, the dysfunctional brain is more sensitive to further reductions of cholinergic activity such as those caused by propofol. Furthermore, there is no significant difference between the pre-operative and post-operative MMSE score measured at 1 h. This shows that cognition remains unaffected after general anesthesia and with the use of propofol as an infusion for maintenance of anesthesia. However, the timing of obtaining post-operative MMSE scores might affect the results. Therefore, further evaluation has to be done regarding the timing of post-operative MMSE.

**CONCLUSION**

Our results show that the pre-existing cognitive status of the elderly significantly affected the propofol requirement to maintain hypnosis, mainly the dose reduction of propofol in the presence of cognitive dysfunction. The cognitive function of the patient is preserved after anesthesia with propofol infusion titrated to maintain BIS.
values between 40 and 60. We suggest that the clinical pre-
operative assessment of the cognitive status of the patient
using MMSE could be an effective tool to improve the
delivery of anesthesia regimen in patients over 65 years.

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Study of Association of Environmental Factors in Myopic Children

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Aim
The aim of the study is to analyze the environmental factors in association with various grades of myopia in school going children.

Objectives
To study the following parameters in myopia:
1. Environmental factors in association with myopia
2. Percentage of regular users.

MATERIALS AND METHODS
A prospective study was conducted in 105 myopic patients of age 13-17 years who attended the Outpatient Department of Ophthalmology, Thanjavur Medical College from June 2015 to May 2016. Informed consent was obtained from parents. A questionnaire was given to all the children and was asked to fill it up with the help of their parents. The parameters which were stressed in the questionnaire were age and sex of the children, their residency, their outdoor/indoor activities.

INTRODUCTION
Myopia is very common in India. It is a major cause of visual disability. As per NPCB survey in 2006-2007 uncorrected refractive error¹ accounts for 19.70% of bilateral blindness second only to cataract. In Tamil Nadu, 21% of people have low vision due to refractive error. Since prevention is not possible, the percentage of visual disability and amblyopia can be reduced by early detection of cases, assessing their regular wear, stressing the significance of concentrating in outdoor activities and teaching the parents regarding periodic follow-up of their children by an ophthalmologist.

Abstract
Background: Refractive error accounts for 19.7% of blindness and myopia is the most common refractive error. Early detection, assessing the regular wear of glasses and stressing the importance of outdoor activities are important in myopic patients.

Aim and Objectives: To analyse the environmental factors in association with various grades of myopia in school going children.

Methods: A prospective study of 105 myopic patients of age 13-17 years was carried out at Department of Ophthalmology during June 2015 to May 2016. Questionnaire regarding their residency, outdoor and indoor activities were completed by all patients and were examined for visual acuity and cycloplegic refraction.

Results: In our study, 43.8% were males and 56.2% were females. 61% of myopes were from urban area and 39% were from rural area. Outdoor activities were seen in 75.6% of rural children and 19% of urban children. 47.6% of low myopes and only 15% of moderate myopes had outdoor activities. 79.7% of low myopes and all 100% of moderate myopes showed indoor activities.

Conclusion: Myopia and its related visual impairment may affect the quality of life in children. Early recognition and influence of environmental factors should be emphasized. Pediatrician, teachers and parents play a crucial role.

Key words: Activities, Myopia, Rural, School children, Urban
Inclusion Criteria
1. Children with myopia (low to high degree myopia)
2. Children in the age group of 13-17 years
3. Both males and females included.

Exclusion Criteria
1. Children <13 and more than 17 years
2. Children with congenital anomalies
3. Children with previous ocular trauma or surgery.

The criteria regarding outdoor activities as per the study were playing outdoor games or staying outdoors for 1 h or more in a day.

The criteria regarding indoor activities as per the study were continuous reading for more than 2 h or playing with electronic gadgets (laptop, mobiles, and video games) for more than 1 h or watching television for more than 2 h in a day.

The criteria for irregular users as per this study were those who have been prescribed spectacles in the previous 6 months by an ophthalmologist and who were not wearing the spectacles.

Refraction was done in two stages, first under cycloplegic drug using 2% homatropine which was instilled in the inferior conjunctival cul-de-sac twice at an interval of 10 min. Cycloplegia was considered complete if pupil dilated to 6 mm or more and there was no pupillary reflex. Retinoscopy was done using a streak retinoscope. Subjective acceptance was done at a visit after 1 week and post mydriatic test was done. The refractive error was documented based on the subjective acceptance. The children were prescribed with spectacles. The examination was done by a single trained person to avoid inter observer variations.

RESULTS

Among 105 children who attended the outpatient department, 56.2% were females and 43.8% were males (Table 1), and 61% were town residents and 39% were village residents (Table 2).

In our study, out of 105 children, 41.9% of children had involvement in outdoor activities (Table 3) and 83.8% of children showed involvement in indoor activities (Table 4).

In our study, out of 105 children, 90 children were regular users, and 15 were irregular users (Table 5 and Chart 1).

Among 105 children examined, 80% came under the category of low myopia (<3.00 D), 19% under moderate myopia (3.00-6.00 D), and only 1% was high myopia.
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The grading of myopia as per sex showed that 57.2% females were low myopes as compared to males (42.8%) and 55% females were moderate myopes as compared to males (45%) (Table 7).

In our study, 53.6% town residents were low myopes and 46.4% villagers were low myopes, and 90% of town residents were moderate myopes as compared to the counterpart (10%) (Table 8).

In our study, out of 84 children with low myopia, 72 were regular users, and 12 were irregular users. 85% of children (>6.00 D) and were excluded from the study for further comparisons (Table 6).

The grading of myopia as per sex showed that 57.2% females were low myopes as compared to males (42.8%) and 55% females were moderate myopes as compared to males (45%) (Table 7).

In our study, 53.6% town residents were low myopes and 46.4% villagers were low myopes, and 90% of town residents were moderate myopes as compared to the counterpart (10%) (Table 8).
with moderate myopia were regular users and 15% of children were irregular users (Table 9 and Chart 2).

In our study, 47.6% of low myopes had outdoor activity and 52.4% had no significant outdoor activities. Only 15% of moderate myopes had outdoor activities and 85% had no significant outdoor activities (Table 10). 79.7% of low myopes had indoor activity and 20.3% had no indoor activity. Among moderate myopes, 100% had indoor activity (Table 11 and Chart 3).

Analyzing the outdoor activities among different residencies, 75.6% of rural children showed significant outdoor activities as compared to only 19% of urban children (Table 12).

**DISCUSSION**

A total of 105 children who visited our Outpatient Department in Government Raja Mirasudhar Hospital, Thanjavur Medical College, Thanjavur, were analyzed in this study period of June 2015 to May 2016.

It was found that among 105 children, the occurrence of myopia in males was 43.8% and in female 56.2% which correlates with the previous studies. Magnitude of myopia was more in town residents (61%) as compared to village residents (39%) which correlate with the study of Foster et al. and other studies. It was found that among the previous myope’s females were irregular users (20.3%) as compared to males (6.7%) which correlate with the study of Prema et al. and Sonam et al. In addition, it was found that irregular usage was more in villagers (22%) as compared to town residents (9.6%) which showed that awareness regarding regular usage and periodic visits to ophthalmologist was less in them.

It was found that outdoor activity was more in village residents (75.6%) as compared to town residents (19%) which might be responsible for the lower magnitude of myopia in them. Hence, the significance of exposure to sunlight in this study correlates with that of Rose and Morgan et al.

It was found that almost all the town residents had indoor activities as compared to villagers (58.5%) which might again contribute to the higher magnitude of myopia in town children. The percentage of nil indoor activities in 41.5% of villagers was surprising that even today certain villagers do not have electronic gadgets such as television and mobiles as per the history elicited from parents.

It was found that 52.4% of low myopes had no outdoor activity while 47.6% had outdoor activity. On the other hand, 85% of moderate myopes had no outdoor activity while the rest 15% had outdoor activity. The percentage of moderate myopia was high in those not involved in outdoor activity.

It was found that the percentage of females with outdoor activity was 32.2% as compared to males 53.3%. Although it was not statistically significant; it’s a bitter truth that girl children are not allowed for outdoor physical activities right from their high school level.

**CONCLUSION**

The literature on myopia was studied. Materials and methods employed were stated. In the study of 105 children, out of 40 village children, 95% has low degree of myopia, and 5% has moderate myopia. Out of 65 town children, 72% has low degree of myopia and 26% has moderate myopia. Out of 26 girls in village, 30.76% had the previous history of irregular use of glasses. Out of 33 girls from town 63% had a history of limited outdoor activity, and out of 32 boys from town 31% had limited outdoor activity due to study pressure. Almost all children gave a history of playing with computers and mobiles.

With school health programs, early diagnosis of children with refractive error helped to decrease the incidence of amblyopia significantly.

This study stressed the significance of periodic follow-up of all myopic children since there are a significant number of irregular users especially girls since they feel shy (as per history).

As per the study of Morgan, adequate exposure to sunlight has a significant role in slowing down the progression of myopia by controlling the axial growth of eyeball. Hence, parents must be taught about the significance of involving them in outdoor activities. Parents are happy to say that their children are bookworms. This idea should be totally swept out of their mind and children in the study were given health education.

Myopia and its related visual impairment may affect the productivity, mobility, and quality of life when these children become tomorrow’s citizens. Hence, not only early recognition of myopia is important but also the awareness regarding its progression and the influence of environmental factors should be emphasized.

**Role of Pediatrician**

Sedentary lifestyle and intake of high saturated fat increase the risk of progression of myopia. Hence, pediatricians who deal with childhood obesity not only play a role in reducing childhood mortality due to systemic complications of obesity but also are responsible for preventing ocular morbidity by giving health education.
Role of Teachers
Although our school education curriculum allotted certain periods for physical education; it is not practically followed especially in urban schools. Hence, awareness programs must be conducted periodically in schools regarding the significance of physical activity in schools. The progress cards provided by schools must have a separate column regarding the child’s sports status.

Role of Parents
Last but not the least, parents have a crucial role in preventing their children becoming educated blind. Parents must encourage them in their sports activities. They must take them outdoors periodically.

To conclude myopia is always a simple study to start with but the upcoming data are promising regarding control of its progression. As per recent studies treatment of myopia is not only optically oriented but also it’s a multidisciplinary approach. Hence, periodic review studies on myopia in school children always gain importance.

Questionnaire
1. Name:
2. Age/Sex:
3. Standard:
4. Address:
5. Personal history:
   1. Playing outdoor games or staying outdoors for 1 h in a day.
   2. Continuous reading more than 2 h.
   3. Playing with electronic gadgets (laptop, mobiles, and video games) for more than 1 h.
   4. Watching television more than 2 h.
6. Previous history of eye check-up.

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Multidetector Computed Tomography Evaluation of Subtypes of Renal Cell Carcinoma

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Abstract

Introduction: Renal cell carcinoma (RCC) accounts for approximately 5% of all cancers in men and 3% in women and is the second most common urologic neoplasm.¹

Aim: The purpose of our study is to identify the different demographic characteristics of patients with RCC, to study different features of subtypes on multidetector computed tomography (MDCT), and to determine the differentiating features of subtypes.

Materials and Methods: We reviewed four subtypes of RCC, 24 patients with RCC who underwent nephrectomy, pre-operative MDCT evaluation, and with pathological diagnosis of RCC were included in our study. Features of tumors and attenuation pattern in CT were evaluated and analyzed.

Results: The clear cell RCC was the most common (75%) tumor subtype with smaller size of the lesion at presentation, heterogeneous enhancement, and cystic degeneration, hypervascularity with post-contrast HU of >100 in corticomedullary phase. The tumor had various patterns of spread and the tumor to aorta enhancement ratio was >0.3. The papillary RCC (pRCC) was 17%, smaller lesions, and hypovascular with post-contrast HU of <100. The tumor-to-aorta enhancement ratio was <0.23. Single case of translocation type RCC (4%) and chromophobe RCC (4%) were observed which presented with intermediate features and tumor-to-aorta enhancement ratio was 0.3 and 0.23-0.3, respectively. Chromophobe RCC showed calcification and high attenuation values. Excepting pRCC, other subtypes were observed more in females.

Conclusion: In addition to CT tumor attenuation values, the combination of other parameters play an important role in diagnosing and differentiating among the different subtypes of RCC. Other important differentiating parameter observed was tumor-to-aorta enhancement ratio.

Key words: Chromophobe, Clear cell, Papillary, Subtypes

INTRODUCTION

Renal cell carcinoma (RCC) accounts for approximately 5% of all cancers in men and 3% in women and is the second most common urologic neoplasm.¹ RCC accounts for 85-90% of all kidney tumors, representing 1-3% of all malignant visceral neoplasms and have maintained an increasing prevalence.¹² Clear cell RCC is the most common variety accounting for 70% followed by papillary RCC (pRCC) 10%, chromophobe RCC (Chr RCC) 5%, collecting duct carcinoma - <1%, medullary carcinoma <1%, mucinous tubular and spindle cell carcinoma - <1%, neuroblastoma-associated RCC - <1%, Xp 11.2 translocation - TFE3 carcinoma - <1%, and unclassified lesions - 4%.²

Early mortality of most of the (40%) of patients with RCC is because of the disease progression, advanced stage at presentation, and delayed diagnosis. Thus, this tumor is the most lethal malignant urological tumor. The histological classification of RCCs is extremely important, due to implications of the subtypes in the prognosis and treatment of these tumors.³⁴ In this context, a pre-operative radiological characterization of RCCs subtypes is of utmost importance and depending on the clinical situation, it may be supplemented or not by confirmatory percutaneous biopsy.³⁴
In 2013, the International Society of Urological Pathology proposed a new RCC classification including the WHO proposal but suggesting the inclusion of five new, well-characterized types of renal neoplasm, and three additional types considered as new and emerging entities. 

Imaging methods play a relevant role in the diagnosis of RCCs, determining a tendency toward the diagnosis of tumors at earlier stages, besides being essential for staging and therapeutic planning. Most of the renal tumors are discovered on imaging studies for urological or other concerns. And also, some past studies proved the possibility of histological diagnosis of renal tumors by imaging features. Computed tomography (CT) has been widely used for the evaluation of RCC because it can provide detailed information about the tumor itself and its perinephric extension, extension to renal vein and lymphatic spread. Furthermore, with the use of helical CT, it is possible to analyze the enhancement pattern of the tumor. All the previous studies reported that stronger enhancement pattern was the most important differentiating feature among the subtypes. In addition, the study conducted by Herts et al. discussed another parameter of tumor-to-aorta enhancement ratio, which when considered the sensitivity of diagnosing papillary cell carcinoma increases by 50%. 

Aim

The current study was aimed to study the demographic characteristics and main imaging findings of the histological RCC variants in author's current location on multidetector CT (MDCT) and to study the important imaging features to differentiate among the subtypes.

MATERIALS AND METHODS

Patients

This is a retrospective study. We used our institutional database to identify patients who underwent surgical management of renal tumors from January 2011 to May 2015. This study was conducted after obtaining the approval from the Institutional Review Board to review the patients images and medical charts. Patients who had pre-operative CT evaluation in our institution according to our institution's renal mass protocol involving four phases (unenhanced, corticomedullary, nephrographic, and excretory) and had confirmed the pathological diagnosis of subtype of RCC were included in this study. The study population included were 24 patients.

CT Examination

All the MDCT examinations were performed using 16-slice GE Lightspeed CT scanner. Unenhanced and contrast material enhanced CT scans were performed in suspended inspiration. Intravenous contrast was given as Omnipaque 300 (Iohexol) 150 ml bolus containing 40-45 g of iodine through antecubital vein at a rate of 2-4 ml/s. Scanning parameters were: Collimation - 1.3 mm, pitch - 2:1, subsecond scan time, kVp - 120, and mAs - 210. Images were obtained with unenhanced scan (negative oral contrast, Mannitol), post-contrast scan - the corticomedullary phase with scan delay of 25-70 s, nephrographic phase with scan delay of 80-180 s, and the excretory phase with scan delay of approximately 180 s were done.

Imaging Evaluation

Two radiologists independently reviewed the contrast-enhanced computed tomography (CECT) images in consensus. The following parameters were studied.

1. The demographic features of the patients underwent study
2. Imaging features of the renal tumors on plain and CECT in four phases were evaluated. Lesion size, presence, type and attenuation, calcification and characteristics of tumor spread, and metastases. The attenuation values were obtained in all four phases using ROI of 1-3 cm². Average of three readings was taken along the circumference of the tumor. Attenuation values were obtained separately for cortex and solid-enhancing area of the tumor.

Data Analysis

The data were analyzed using SPSS program. The results were presented using tables.

RESULTS

CT images of 24 patients were retrospectively reviewed by two radiologists. The incidence of RCC was more in the patients in 40-59 age group (83%). The male-to-female ratio observed was 11:13 and side of the kidney involved showed no difference (Table 1).

Four subtypes of RCCs were observed in our study and were cRCC (Figure 1), pRCC (Figure 2), Xp 11.2 translocation-TFE3 carcinoma (translocation RCC, TrRCC) (Figure 3), and Chr RCC (Figure 4). Most common subtype observed was clear cell carcinoma, followed by pRCC. One case of translocation RCC and one case of Chr RCC were observed (Figure 5).

Characteristics of Clear Cell Renal Cell Carcinoma (Figure 1)

Demographic characteristics

According to our study, cRCC was more common among females (56%) in 40-59 years (89%) age group and was predominantly in the right kidney (61%) (Table 2).
**Characteristics of lesion**

Most of the tumors (56%) were smaller (≤200 cc) at presentation with smooth margins (89%), heterogeneous enhancement pattern and with cystic degeneration (89%). Very few (11%) presented with calcifications (Table 3). The tumor-to-aorta enhancement ratio observed was >0.3. The attenuation of solid areas of tumor on CECT was high and was paralleling the renal cortex (75-145 HU) than the papillary, chromophobe, and translocation types which were comparatively low in attenuation (Table 4).

**Spread of the disease**

The cRCC spread was mainly to the perinephric fat (67%). Local spread to the adjacent organs was less (11%). Other way of spread observed was through the ureter (11%), renal vein (33%), and inferior vena cava (IVC) (22%). Lymphatic spread to regional lymph nodes was more (78%). In our study, no distal lymph node involvement was observed. The metastatic spread was less (11%) and was mostly (60%) to the lung followed by to liver and bones (lumbar vertebrae) (Tables 5 and 6).

**Papillary Renal Cell Carcinoma (Figure 2)**

The age distribution of pRCC was similar to clear cell carcinoma (44-48 years), and the male-to-female ratio was 3:1. Our study showed more predilection of pRCC to left kidney (Table 2). The size of the lesion at presentation was smaller compared to cRCC (32-90 cc) with no calcifications observed within the lesion.

### Table 1: Distribution of demographic characteristics of the patients with RCC

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N=24 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age range (years)</td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>1 (4.1)</td>
</tr>
<tr>
<td>10-39</td>
<td>1 (4.1)</td>
</tr>
<tr>
<td>40-49</td>
<td>14 (58.3)</td>
</tr>
<tr>
<td>50-59</td>
<td>6 (25)</td>
</tr>
<tr>
<td>60-69</td>
<td>2 (8.33)</td>
</tr>
<tr>
<td>Distribution of the patients according to sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11 (45.8)</td>
</tr>
<tr>
<td>Female</td>
<td>13 (54.2)</td>
</tr>
<tr>
<td>Side of the kidney involved</td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>12 (50)</td>
</tr>
<tr>
<td>Left</td>
<td>12 (50)</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma

### Table 2: Distribution of patients with RCC according to demographic characteristics and side of the kidney involved

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Clear cell RCC N=18 (75%)</th>
<th>pRCC N=4 (17%)</th>
<th>Translocation type RCC N=1 (4%)</th>
<th>Chr type RCC N=1 (4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>0</td>
<td>0</td>
<td>1 (7 years)</td>
<td>0</td>
</tr>
<tr>
<td>10-39</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (27 years)</td>
</tr>
<tr>
<td>40-49</td>
<td>10 (55.6)</td>
<td>4 (100)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50-59</td>
<td>6 (33.3)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60-69</td>
<td>2 (11.1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8 (44)</td>
<td>3 (75)</td>
<td>Nil</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>10 (56)</td>
<td>1 (25)</td>
<td>1 (100)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Side of the kidney involved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right kidney</td>
<td>11 (61)</td>
<td>Nil</td>
<td>Nil</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Left kidney</td>
<td>7 (39)</td>
<td>4 (100)</td>
<td>1 (100)</td>
<td>Nil</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma, pRCC: Papillary renal cell carcinoma, Chr RCC: Chromophobe renal cell carcinoma
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Table 3. Maximum attenuation on NECT was 43 HU and on CECT was 60 HU in corticomedullary phase with majority showed homogenous enhancement pattern. The tumor/aorta enhancement ratio was <0.3 (0.15-0.23) (Table 4). All the observed lesions showed perinephric spread. No spread was observed to the adjacent organs, renal vein, and ureter. Spread to the regional lymph nodes was 50% and no spread to the distal lymph nodes. In our study, pRCC had not showed any distal organ metastases (Tables 5 and 6).

Translocation Renal Cell Carcinoma (Figure 3)
One translocation RCC was observed in our study in female patient in pediatric age group involving the left kidney (Table 2). The size of the tumor at presentation was 40 cc, which showed regular margin with no calcification and degeneration (Table 3). The other characteristics observed were homogenous enhancement pattern. The attenuation of the mass was high compared to pRCC in NECT and CECT and low compared to cRCC. The tumor-to-aorta enhancement ratio was 0.3 (Table 4). The type of spread observed was to the regional lymph nodes. No other type of spread was observed (Tables 5 and 6).

Chromophobe Renal Cell Carcinoma (Figure 4)
A case of 27-year-old female was presented in our study (Table 2). The size of the lesion was larger (>200 cc) at presentation. The lesion is homogenous, isodense with renal parenchyma showed lobulated margin with calcifications within. No degeneration was noticed (Table 3). Post-contrast HU of the lesion was <100 and is histologically hypovascular. The tumor showed maximum enhancement in nephrographic phase compared to other subtypes. Tumor-to-aorta enhancement ratio was >0.23 and <0.3 (Table 4). No characteristic tumor spread was identified (Tables 5 and 6).

DISCUSSION
The classification of RCC was mainly based on the microscopic appearance of the tumor and genetic abnormalities. Each subtype is associated with a different prognosis and tumor behavior. Patients diagnosed with papillary carcinoma and chromophobe subtype have higher 5-year survival rate than those with conventional RCC.

There are different studies conducted for the identification of CT features of subtypes of RCC. According to them, strong enhancement equal to the renal cortex was observed in conventional RCC.

In our study, we found enhancement pattern was different among four subtypes of RCC with high-attenuation values of cRCC in corticomedullary phase. The clear cell carcinoma showed strong enhancement pattern with high-attenuation values in all phases compared to other
Table 3: Distribution of patients with RCC according to tumor characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Clear cell RCC $N=18$ (75%)</th>
<th>pRCC $N=4$, (17%)</th>
<th>Translocation RCC $N=1$ (4%)</th>
<th>Chr RCC $N=1$ (4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤200 cc</td>
<td>10 (55.6)</td>
<td>4 (32-90 cc)</td>
<td>1 (40 cc)</td>
<td></td>
</tr>
<tr>
<td>&gt;200 cc</td>
<td>8 (44.4)</td>
<td>0</td>
<td>0</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Margin (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smooth</td>
<td>16 (88.9)</td>
<td>2 (50)</td>
<td>1 (100)</td>
<td></td>
</tr>
<tr>
<td>Irregular</td>
<td>2 (11.1)</td>
<td>2 (50)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Calcification</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>2 (11.1)</td>
<td>0</td>
<td>0</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Not present</td>
<td>16 (88.9)</td>
<td>4 (100)</td>
<td>1 (100)</td>
<td></td>
</tr>
<tr>
<td>Cystic degeneration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>16 (88.9)</td>
<td>2 (50)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>2 (11.1)</td>
<td>2 (50)</td>
<td>1 (100)</td>
<td>1 (100)</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma, pRCC: Papillary renal cell carcinoma, Chr RCC: Chromophobe renal cell carcinoma

Table 4: Distribution of patients with RCC according to CECT characteristics of tumor

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Clear cell RCC $N=18$ (75%)</th>
<th>pRCC $N=4$, (17%)</th>
<th>Translocation RCC $N=1$ (4%)</th>
<th>Chr RCC $N=1$ (4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement pattern (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homogeneous</td>
<td>10 (55.6)</td>
<td>3 (60)</td>
<td>1 (100)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Heterogeneous</td>
<td>8 (44.4)</td>
<td>1 (40)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tumor/aorta enhancement ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;0.3</td>
<td>4 (0.15-0.23) (100)</td>
<td>1 (&gt;0.23-0.3) (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;0.3</td>
<td>18 (100)</td>
<td>0</td>
<td>1 (100)</td>
<td></td>
</tr>
<tr>
<td>CECT attenuation of solid area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corticomedullary phase</td>
<td>75-145 HU</td>
<td>40-66 HU</td>
<td>94 HU</td>
<td>90 HU</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma, pRCC: Papillary renal cell carcinoma, Chr RCC: Chromophobe renal cell carcinoma, CECT: Contrast-enhanced computed tomography

Table 5: Distribution of patients with RCC according to characteristics of tumor spread

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Clear cell RCC $N=18$ (75%)</th>
<th>pRCC $N=4$, (17%)</th>
<th>Translocation RCC $N=1$ (4%)</th>
<th>Chr RCC $N=1$ (4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinephricspread (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>12 (67)</td>
<td>4 (100)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not present</td>
<td>6 (33)</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Adjacent organs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved</td>
<td>2 (11)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not involved</td>
<td>16 (89)</td>
<td>4 (100)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ureter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved</td>
<td>2 (11)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not involved</td>
<td>16 (89)</td>
<td>4 (100)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Renal vein</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involved</td>
<td>6 (33.3)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not involved</td>
<td>12 (66.7)</td>
<td>4 (100)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IVC involved</td>
<td>4 (22)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IVC not involved</td>
<td>14 (78)</td>
<td>4 (100)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma, pRCC: Papillary renal cell carcinoma, Chr RCC: Chromophobe renal cell carcinoma, IVC: Inferior vena cava

Table 6: Distribution of patients with RCC according to spread to lymphnodes and distant metastases

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Clear cell RCC $N=18$ (75%)</th>
<th>pRCC $N=4$, (17%)</th>
<th>Translocation RCC $N=1$ (4%)</th>
<th>Chr RCC $N=1$ (4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphadenopathy (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td>14 (78)</td>
<td>2 (50)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Distal</td>
<td>0</td>
<td>2 (50)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Metastases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present</td>
<td>2 (11)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Not present</td>
<td>16 (89)</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

RCC: Renal cell carcinoma, pRCC: Papillary renal cell carcinoma, Chr RCC: Chromophobe renal cell carcinoma
tumors (Table 4). Similar enhancement pattern was also observed in other studies.  

The strong enhancement pattern of cRCC is caused by its rich vascular network and alveolar architecture at histological examination. In addition to enhancement pattern, calcifications, and cystic degeneration are other important differentiating features observed which in combination will help in diagnosing cRCC from other subtypes. The hemorrhage and necrosis within the tumor at pathologic examination are the cause for heterogeneous enhancement pattern. Other important finding observed was tumor-to-aorta enhancement ratio which was >0.3 in cRCC. Spread of the lesion is another important feature which the cRCC in our study showed in addition to perinephric space spread, spread to regional lymphnodes, adjacent organs and to renal vein, IVC, ureter, and distant organ metastases.

The papillary carcinoma was the second highest incidence (17%) in our study. The homogeneous enhancement pattern with less attenuation values compared to cRCC is because of hypovascularity of the tumor. Calcifications were not present in our study, which was against to other studies. This could be due to less number of cases. The tumor aorta enhancement ratio was <0.3 (0.15-0.23), this could be again due to hypovascularity of the lesion.

Series of the previous reports on subtypes of RCC were done but less information was published regarding the XP translocation RCC, because of rarity of the tumor (<1%). Our study found one translocation RCC in pediatric age group, in female patient as described in the previous study. The attenuation pattern of the lesion was homogenous with higher values than papillary carcinoma (58 and 90 HU), and this could be attributed to hypervascularity of the tumor. The tumor aorta enhancement ratio was 0.3. Histologically, the tumor shows hemorrhage and necrosis.

A case of chromophobe RCC presented in our study showed similar features like the study conducted by Raman et al. However, the findings cannot be compared due to single lesion.

**Limitations**

Main limitation of our study is smaller sample size, less number of pRCC, Chr RCC, and translocation RCC subtypes to analyze characteristic CT features. This could also be due to lower incidence of the these subtypes. However, further investigation with adequate number of sample will be necessary to study these low-incidence RCC subtypes.

**CONCLUSIONS**

This study indicates not only the tumor attenuation which is identified as the most important differentiating feature but also the MDCT assessed other parameters such as size at presentation, heterogeneity, tumor spread, and tumor/aorta enhancement ratio when used in combination can help to distinguish between different subtypes of RCC (especially cRCC and other RCC subtypes). Our data should be confirmed and validated by larger and prospective study.

**ACKNOWLEDGMENT**

The author would like to thank radiology staff and medical record department staff of VIMS and RC, Bengaluru, for their support in retrieving the records and images of the patients.

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Functional Outcome of Cemented Bipolar Hemiarthroplasty for Unstable Intertrochanteric Fractures of Femur in Elderly: An Indian Perspective

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Abstract

Introduction: The management of unstable intertrochanteric fracture in elderly patients poses the challenges of difficult anatomical reduction as well as the need for prolonged immobilization and delayed weight bearing to prevent implant failure secondary to poor bone quality. Because of prolonged immobilization, complications such as deep vein thrombosis, hypostatic pneumonia, pressure sores, dehydration, atelectasis, and metabolic disturbances may increase the morbidity and mortality. The purpose of this study was to evaluate the use of cemented bipolar hemiarthroplasty as the primary treatment in unstable intertrochanteric fractures in patients above 70 years of age.

Materials and Methods: This prospective study was conducted at Department of Orthopedics, B. J. Medical College and Sassoon General Hospital, Pune, Maharashtra, during July 2008 to May 2010. Records of total 34 patients with unstable intertrochanteric fractures treated under our hospital’s Orthopedic Department were analyzed.

Results: Out of 34 patients enrolled in the study, 2 patients died during the study, hence the results of remaining 32 patients were analyzed with an average follow-up of 12 months. The average age of the patient was 79.35 years (range 70-94 years). The average surgery time was 82.53 min (range 62-110 min). The average intraoperative blood loss was 409.37 cc and average stay in the hospital was 14.53 days (range 5-21 days). At 1-year follow-up with help of Harris Hip Score, 8 patients (25%) were graded as excellent, 10 patients (31.25%) as good, 10 (31.25%) as fair, 2 (6.25%) as poor, and 2 (6.25%) as failed.

Conclusion: Treatment of unstable intertrochanteric fractures in elderly patients with cemented bipolar hemiarthroplasty results in reduced complications of prolonged immobilization and easy rehabilitation along with rapid return to functional level.

Key words: Cemented bipolar hemiarthroplasty, Complications, Unstable intertrochanteric fractures

INTRODUCTION

Intertrochanteric fractures of the femur are one of the most common fractures in elderly. Due to an increasing life span as well as higher incidence of concurrent osteoporosis in elderly, the incidence of these fractures is on the rise.¹

Unstable intertortchanteric fractures in elderly patients are associated with high rates of morbidity and mortality due to the need for prolonged immobilization, although the results have improved with use of internal fixation.²

Due to combination of unstable fracture pattern and osteoporosis, early post-operative resumption of full weight bearing is difficult. In the elderly age group, it is also difficult for the patient to have adequate mobility due to problems such as cataract and other geriatric problems.

Of all the conditions that elderly people suffer from osteoporosis is a crucial factor that comes into play when the management of any fracture is undertaken. Nearly
90% of the fractures are result of fall in elderly whose proximal femoral bone density is well below fracture threshold. Biological and biomechanical changes that occur in osteoporosis make the management of these fractures more difficult. Cortical bone becomes thin and cancellous bone has reduced bone mineral density with changes in the trabecular pattern. Thus, implant fixation is compromised. In case of comminuted fractures, fixation of fragments is difficult and the posteromedial void in this region makes the fracture very unstable and internal fixation with conventional implants such as dynamic hip screw or Jewett nail plate makes these implants more prone for cutting out. Newer modality of fixation of these fractures is by intramedullary nails such as the gamma nails or the proximal femoral nails. Even with these implants, immobilization is required for few days.

Management of such cases with primary cemented bipolar hemiarthroplasty permits early mobilization, thus avoiding most of the complications related to prolonged immobilization. The patient is mobilized early giving good rehabilitation and better options for dependence free living.

In the present study, we evaluated the use of cemented bipolar hemiarthroplasty as primary treatment in unstable intertrochanteric fractures in patients above 70 years of age.

**MATERIALS AND METHODS**

This prospective study was done in Sassoon Hospital and B. J. Medical College, Pune, under the guidelines of the Institutional Ethics Committee of the hospital. A total of 32 patients aged >70 years who were ambulatory before trauma who suffered fresh unilateral closed unstable intertrochanteric fractures and presenting to our tertiary hospital were considered. Patients having life-threatening head, abdominal, or chest injuries, those with mental illness, rheumatoid arthritis, or osteoarthritis of hip, burns, and/or immunocompromised status were excluded from this study. Those patients with associated major lower limb injuries that would interfere with ambulation were also excluded from this study.

Anteroposterior X-ray of the pelvis with both hips and lateral view of the injured joint were taken (Figure 1). 100 mm scale views of the injured side taken for head size templating. Injured limb was kept in a Thomas splint with skin traction with adequate cotton padding to correct flexion deformity if any and to prevent overriding whenever present.

Pre-operative routine blood and urine investigations were done. Informed consent was obtained by the patient for both the surgical procedure and participation in the study. Pre-operative medical fitness was taken in all cases. The patients were operated on elective basis after overcoming the avoidable anesthetic risks. Surgery was performed spinal or general anesthesia. All the cases were operated by same surgical team using the standard posterolateral approach.
to hip under standard aseptic precautions. After assessing the fracture anatomy and extraction of the femoral head (Figure 2), appropriate size of cemented bipolar prosthesis was put (Figure 3). In cases of posteromedial comminution, reconstruction using stainless steel wires, Kirschner wires, or ethibond sutures were done before insertion of the final bipolar prosthesis (Figure 4). Greater trochanteric comminution was also reconstructed in the same way as far as possible.

Post-operatively, adequate analgesics and antibiotics were given. Post-operative X-rays were done (Figure 5). Operated limb was kept in 30° abduction with help of pillow between both thighs. All the patients were allowed to sit in bed on the 2nd post-operative day and walking partial weight bearing with the help of walker from 3rd day. Full weight bearing was allowed gradually as per pain tolerance. Sutures were removed 2 weeks after surgery. Patients were followed up for 3, 6, 9 months, and 1 year after surgery. Patients were assessed by both clinical and radiological examination at every follow-up. Clinical follow-up was based on Harris Hip Score with grading as <70 poor, 70-79 fair, 80-89 good, and 90-100 excellent.

**RESULTS**

The following observations were made from the data collected during the study.

Out of 34 patients, 2 patients could not complete the study as they expired due to causes unrelated to orthopedic surgery (one died due to myocardial infarction and another due to intracranial bleed following road traffic accident). Thus, a total study of 32 patients was carried out.

Of 32 patients, there were 8 (25%) females and 24 (75%) males. The youngest patient in our series was 70 years and the oldest was 94 years. The average age of the patient was 79.35 years. Thirty patients (93.75%) were community ambulatory pre-operatively, and 2 (5.88%) were only household ambulatory.

A total of 13 patients were operated within 3 days, 10 patients in 4-7 days, and 5 patients in 8-11 days. 4 required more than 11 days to get operated due to comorbidities.

The average surgery time was 82.53 min (range 68-110 min). The average intraoperative blood loss was 409.37 cc (range 125-700 cc). Nine patients needed blood transfusion. The patients average stay in the hospital was 14.53 days (range 5-30 days). The patients started full weight bearing ambulation at an average of 5.1 days post-surgery (range 2-10 days).

One patient developed a stitch abscess which was drained under local anesthesia and healed uneventfully with 1 week of intravenous antibiotics and 1 week of oral antibiotics. One patient developed pneumonia which settled down in 3 weeks with intravenous antibiotics.

According to Harris Hip Score at 3 months (Table 1), 5 patients were graded as excellent, 11 patients as good, 12 patients as fair, 2 patient as poor, and 2 patients as failed.

At 1-year follow-up (Table 2), 8 patients were graded as excellent, 10 patients as good, 10 as fair, 2 as poor, and 2 as failed. 14 patients were walking without any aid, 14 patients had a limp and used a stick for walking, 2 patients used a walker, and 2 were wheelchair bound. The patient with
a poor result had stitch abscess which was drained under local anesthesia and healed uneventfully with 1 week of intravenous antibiotics and 1 week of oral antibiotics. However, the patient had a limp while walking. Of the failed results, one patient was bed-ridden due to medical reasons and was wheelchair bound.

The second patient with the failed result was not cooperative with the physiotherapy program. The patient later had attempted squatting down causing dislocation of prosthesis but refused to take treatment. The patient eventually became wheelchair bound. No loosening or late infections occurred.

**DISCUSSION**

Literature concerning the treatment and results of comminuted intertrochanteric fracture of the hip are extensive. Massie, Hoit, Dimon and Hughston, Sarmeinto and Williams have done outstanding work in attempt to change an unstable intertrochanteric fracture into a stable one and fix it with a device until it heals.6,7 The reported complication rate for treating unstable intertrochanteric fractures ranges from 18% to 50%.6,7

Despite the fact that union rates of as high as 100% have been published in cases of stable well-reduced fractures that had ideal implant placement, at the same time up to 56% of failure rate has been associated with comminuted, unstable fractures in osteoporotic elderly people with suboptimal fracture fixation.8

Intertrochanteric fractures in the elderly pose certain special problems. In this age group, the fracture configuration is generally comminuted, with extensive osteoporosis being present. Because of extensive osteoporosis and consequent poor mechanical property of bone, frequently inability to get good purchase of screws is encountered leading to subsequent implant failure. This leads to collapse and varus malposition of femoral head causing dysfunction of abductor mechanism manifesting as limping.9 As there are problems of correct and accurate placement of the implant and hold of the implant, hence prolonged immobilization for achieving bony union is advised. On the other hand, there is a need for rapid full weight-bearing mobilization of this group of patients as they are generally medically compromised due to age and associated diseases. In addition, these patients may not have adequate psychomotor skills required for graded and protected weight bearing. Hence, there are two conflicting requirements that need to be addressed to, in a balanced way.

We believe that treating unstable intertrochanteric fractures in a selected group of physiologically elderly group of patients with compromised general health and comminuted fractures in osteoporotic bone stock by primary hemiarthroplasty, the phase of fracture healing is essentially bypassed and a stable, mobile, relatively pain-free joint is immediately provided. This eliminates the need for prolonged immobilization and permits early ambulation. This gives an edge over internal fixation/osteosynthesis in which there is a dilemma between the need of early mobilization versus protection of the hip for bony union. And also, the fears of implant failures and cutouts are eliminated.

Essentially in these patients, there is a need for rapid pain-free full weight-bearing mobilization to restore them to their pre-injury level of activity.

There are multiple studies showing good results with hemiarthroplasty. Liang et al.10 in their study of unstable intertrochanteric fractures concluded that it is an effective method to treat the unstable intertrochanteric fractures in elderly patients with hemiarthroplasty. The result was satisfactory. It can decrease the complications, reduce the mortality, improve the patients living quality, and reduce the burden of the patient’s family.

Grimsrud et al.11 studied 39 consecutive patients of unstable intertrochanteric fractures treated with a cemented bipolar hemiarthroplasty. They concluded that these fractures can be treated with a standard femoral stem and cerclage cabling of the trochanters. The technique allows safe early weight bearing on the injured hip and had a relatively low rate of complications.

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**Table 1: Functional results at 3 months after surgery using Harris Hip Score.**

<table>
<thead>
<tr>
<th>Results</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>5 (15.625)</td>
</tr>
<tr>
<td>Good</td>
<td>11 (34.375)</td>
</tr>
<tr>
<td>Fair</td>
<td>12 (34.5)</td>
</tr>
<tr>
<td>Poor</td>
<td>2 (6.25)</td>
</tr>
<tr>
<td>Failed</td>
<td>2 (6.25)</td>
</tr>
</tbody>
</table>

**Table 2: Functional result 1 year after surgery using Harris Hip Score.**

<table>
<thead>
<tr>
<th>Results</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>8 (25)</td>
</tr>
<tr>
<td>Good</td>
<td>10 (31.25)</td>
</tr>
<tr>
<td>Fair</td>
<td>10 (31.25)</td>
</tr>
<tr>
<td>Poor</td>
<td>2 (6.25)</td>
</tr>
<tr>
<td>Failed</td>
<td>2 (6.25)</td>
</tr>
</tbody>
</table>
Rodop et al.\textsuperscript{12} in a study of primary bipolar hemiarthroplasty for unstable intertrochanteric fractures in 54 elderly patients obtained 17 excellent and 14 good results after 12 months according to the Harris Hip-Scoring system.

In a comparative study of cone hemiarthroplasty versus internal fixation, Kayali et al.\textsuperscript{13} reached the conclusion that clinical results of both groups were similar. Hemiarthroplasty patients were allowed full weight-bearing significantly earlier than the internal fixation patients. Cone hemiarthroplasty can be an alternative treatment for unstable intertrochanteric fractures in elderly patients so as to achieve earlier mobilization.

Stern and Goldstein\textsuperscript{14} reported on 29 patients with intertrochanteric fractures treated with Leinbach prosthesis with excellent results.

Proponents of conventional internal fixation have raised the issues of increased blood loss, infection, and dislocation associated with bipolar hemiarthroplasty. However, Stappaerts et al.\textsuperscript{15} found that there was no difference between two groups except high requirement of blood transfusion in replacement group. In our study, 9 out of 32 patients (28.12\%) required intraoperative or post-operative blood transfusion. Haentjens et al.\textsuperscript{16} found a significant reduction in incidence of pressure sore and pneumonia in patients undergoing prosthesis replacement surgery. In our study, as our emphasis was on faster rehabilitation; out of total 32 patients, only 1 patient (3.12\%) developed pressure sore and another 1 patient (3.12\%) developed pneumonia.

The Indian perspective of using primary hemiarthroplasty as treatment option for unstable intertrochanteric fractures is explored by few authors. Sancheti et al.\textsuperscript{17} concluded that hemiarthroplasty for unstable osteoporotic intertrochanteric fractures in elderly results in early ambulation and good functional results.

Kumar et al.\textsuperscript{18} also concluded that unstable intertrochanteric fractures in elderly are better treated with cemented hemiarthroplasty than with internal fixation. Besides an early ambulation and less hospital stay, cemented hemiarthroplasty provides stable and mobile hips. Weight bearing can be started earlier than in other methods of treatment, which prevents any recumbency related complications.

In our study, all the patients were initiated on static exercises on the first post-operative day for the glutei, hamstrings, and quadriceps and the patients were allowed full weight bearing by 2-10 days.

In our study, early walking with full weight bearing was possible in most 32/34 patients with unstable intertrochanteric fracture who were previously mobile with or without support within 10 days of surgery.

In the present series, the incidence of complications was significantly less possibly due to faster rehabilitation.

CONCLUSION

Treatment of unstable intertrochanteric fractures in elderly patients with cemented bipolar hemiarthroplasty results in reduced complications of prolonged immobilization and easy rehabilitation along with a rapid return to functional level.

LIMITATIONS

The sample size is small and the follow-up is also relatively of shorter duration. Considering fewer Indian studies on the comparison of primary bipolar hemiarthroplasty \textit{a-vis} conventional internal fixation in elderly patients with unstable intertrochanteric fractures, a larger prospective study would be needed.

REFERENCES


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Clinical Presentation and Management of Anorectal Abscess and Fistula-in-ano

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Fistula is differentiated from a sinus which is a granulating track leading from the focus of suppuration to the surface, sinus in Latin means Bay or recess.

A surgeon can treat this lesion successfully with proper knowledge of anatomy of the anal musculature, type of fistula, specific cause of fistula, and with the help of modern surgical procedures. Fistula-in-ano is notorious for its chronicity, recurrence, and frequent acute exacerbations.

Symptoms of an anal fistula are:
1. Discharge which soils the under clothes.
2. Irritation and itching of the skin around the anus.
3. Anal discomfort.

A fistula operation is not a major surgery, but it is far from being a minor one.

The result of operation was not satisfactory in the past and number of them has been subjected to multiple operations.
It has been aptly said more reputations are lost in the treatment of fistula-in-ano than with any other operation the present study of 50 patients (25 each of anorectal abscess and fistula-in-ano) was conducted at Government Medical College and Hospital Aurangabad between March 2003 and November 2005.

Aims
1. To study the different clinical presentation of anorectal abscess and fistula-in-ano.
2. To study the etiology of an anorectal abscess and fistula-in-ano.
3. To study the management of anorectal abscess and fistula-in-ano.
4. To study the complications and outcome anorectal abscess and fistula-in-ano.

MATERIALS AND METHODS

The present study of 50 cases (25 patients of each of anorectal abscess and fistula-in-ano) was conducted at Government Medical College and Hospital Aurangabad between March 2003 and November 2005. In every patient, detailed history and thorough physical examination was done. Duration size and type of anorectal abscess were noted. All the patients with fistula-in-ano were examined thoroughly for the number of external openings and their location as per the Goodsall’s rule. The position of internal opening was noted and the fistulae were classified in relation to anorectal ring. Investigations such as routine hemogram blood sugar, stool examination, culture and sensitivity, and X-ray chest was done. ELISA for HIV 1 and 2 was done for all cases to rule out immunosuppression due to HIV infection. Fistulography was done in five cases of suspected high anal fistulae and recurrent anal fistula. All patients were subjected to operative procedure. Histopathological examination of excised tracts was done in all cases of fistula-in-ano. As per the histological examination reports, treatment was given along the established line. All the patients were reexamined at the time of discharge and were followed in outpatient department regularly for any complaints such as wound behavior, discharge, and recurrence from 1 month to 2 years.

Pelvirectal abscesses were excluded from the present study. There was no case submucus abscess in this study as it is difficult to diagnose and by the time patient presents to the surgeon, the abscess is already drained into the anal canal.

Observation

The present history of 50 patients (50 each of anorectal abscess and fistula-in-ano) was conducted at government medical college and hospital Aurangabad between March 2003 and November 2005.

Anorectal Abscess

Of 25 patients of anorectal abscess, there were 23 males (92%) and two females (8%). The most common age group was 21-30 years with eight patients (32%), followed by five patients (20%) in the age group of 31 = 40 years. There were four patients (16%) in the age group of 1-10 years, and two patients (8%) each in age group of 11-20 years, 41-50 years, 51-60, and >60 years.

Pain and swelling were most common complaints in all patients.

Pain along with fever in five patients (20%) was the presenting feature. There were signs of septicemia in two patients. Diabetes mellitus was associated risk factor in four patients (16%). Hemorrhoids and anal fissure were seen in three patients (12%). There was previous history of anorectal abscess in three patients. Of these 25 patients, 20 patients (80%) were having perianal abscess and five patients (20%) were having ischiorectal abscess. There was no case of submucus abscess 11 patients (44%) had right-sided abscess, 12 patients (48%) had left-sided abscess and two patients had horseshoe anorectal abscess. Cefotaxime was given as a pre-operative antibiotic in 15 patients (60%), ciprofloxacin and tinidazole combination was given in five patients (20%), ampicillin in four patients (16%), and cefepime in one patient. 24 patients (94%) were operated in general anesthesia and one patient under spinal anesthesia. For all patients incision and drainage by cruciate incision was done in lithotomy position. The amount of pus drained was 40-60 ml in 11 patients (44%), and maximum amount of pus drained was 200 ml. Escherichia coli was the most common organism seen in pus culture in 16 patients (16%). Followed by Staphylococcus aureus in five patients (20%) and remaining patients (16%) showed mixed culture. Anaerobic organisms were seen in four patients. There was wide variation in post-operative use of antibiotics by different surgeons. Cefotaxime alone was given to five patients (20%), cefotaxime along with tinidazole to five patients (20%). Ofloxacin, ornidazole combination was
given to three patients (12%). Ciprofloxacin and Tinidazol combination to 5 patients 20%. Ampicillin alone was given to four patients (16%). One patient was given ceftazime as post-operative antibiotics. All patients received antibiotics for minimum period of 7 days.

Pain was the most common post-operative complication observed in 19 in patients (76%), followed by soakage in seven patients (28%), retention of urine in four patients (16%), and constipation in two patients (8%).

All patients were followed from 1 week to 1 year. 24 patients (96%) had healthy granulation at 1-week follow-up, and one patient had poor granulation. 22 patients (88%) had healed wound at 1-month follow-up while one patient developed fistula-in-ano and one patient had recurrent abscess.

At 3-month follow-up, 19 patients (76%) had healed wound while three patients had recurrent perianal abscess (12%) and three patients (12%) developed fistula-in-ano. At 1-year follow-up, 12 patients had completely healed wound and rest 13 patient lost in the follow-up.

**Fistula-in-ano**

Out of 25 patients of fistula-in-ano, there were 22 male patients (88%), and three were female patients (12%).

Maximum incidence was observed in 41-50 years (32%) of age followed by six patients (24%) in age group of 31-40 years. There were five patients (20%) in the age group of 51-60 years. None of the patients were above 60 years of age.

**DISCUSSION**

The present study comprising of 25 patients each of anorectal abscess and fistula-in-ano was conducted to evaluate different clinical presentation and management.

**Anorectal Abscess**

In the present study, there were 92% males and 8% females thus giving a male to female ratio of 11.5:1. Wilson 39 (1964) showed that the anorectal abscesses are twice more common in men as compared to women.

Goligher also found that anorectal abscess twice as common in the males as compared to females.

Mcdonald and Wilson (2003) showed a male to female ratio of 10.5:1. Our study showed high incidence in males as compared to females. In the present study, the most common age group was in third and fourth decade. Wilson showed that anorectal abscess presents in middle years of life. In the present study all patients had either pain or fever as there presenting complain. Goligher also showed that clinical symptoms are pain and swelling in almost all patients.

Marcus et al. noted peri-rectal pain as the most common presenting symptom in 98.9% of the patients. In the present study, 16% of the patients had diabetes mellitus, 12% patients had hemorrhoids and anal fissure and 12% of the patients had previous history of anorectal abscess.

Goligher had also given hemorrhoids and anal fissure as the proven risk factors for anorectal abscess.

In the present study, 80% of the patients had perianal abscess while 20% of them had ischiorectal abscess. There was no case of submucous abscess.

Goligher et al. studied 28 patients and found that 71% of the patients had perianal abscess and 29% of them had ischiorectal abscess. The present study was comparable with the studies done earlier.

Rusteikienė et al. found 68% patients having perianal abscess and 28.5% of the patients having ischiorectal abscess. Cefotaxime was given as pre-operative antibiotic in 16% of the patients. All patients were operated under general anesthesia. Incision and drainage were done by cruciate incision in lithotomy position. An 11-week average amount of pus drained was 40-60 cc in about half of the patients. In the present study, E. coli was the most common organism found in 64% of the patients followed by S. aureus in 20%. Mixed culture and anaerobic organisms were seen in 4 (16%) patients. Brook and Itzhak showed E. coli in 20%, S. aureus in 34% and remaining of the patients showed mixed culture. William showed that pus culture from anorectal abscess yields mixed culture. There was a wide variation in post-operative use of antibiotics depending on the choice of the surgeons and different antibiotic combinations were tried. Cefotaxime alone was given to 20% of the patients, cefotaxime along with tinidazole to 20% of the patients, ofloxacin, and omidazole combination to 12% of the patients and ciprofloxacin and tinidazole combination to 20% of the patients. Ampicillin was given to 16% of the patients and one patient received ceftazime as postoperatively. All patients received antibiotics for minimum period of 1 week.

Pain was the most common complication (76%) in immediate post-operative period followed by soakage in 28%, retention of urine in 16%, and constipation in of the patients. The present study was comparable to previous studies.
Fistula-in-ano
In the present study, there were 88% males and 12% females thus male to female ratio was 7:1.

Benett (1962) showed males having incidence of anal fistula twice more common than in females.

Marks and Ritchie did clinical study of 791 patients treated at St. Mark's Hospital London of fistula-in-ano and showed male preponderance with ratio of 4.62:1.

Misra and Kapur showed in their study male to ferrule ratio of 7:1.

In the present study 72% of the patients were in the age group of 20-50 years with maximum number of patients in 5th decade. Benett (1962) in his study showed greatest incidence in 5th decade, the remainder being evenly distributed on either side in diminishing number.

Deshpande et al. showed in their study that 75% of the patients with fistula-in-ano were between 20 and 50 years of age. We found the same incidence in the present study.

Marks and Ritchie in their study at St. Mark hospital London found three quarters of the patients in both sexes were aged between 30 and 59 years and anal fistula were uncommon in both very young and very old patients.

In the present study, discharge was the presenting complaint in all patients followed by pruritus along with discharge in 40% of the patients.

Marks and Ritchie at St. Mark's hospital London showed that discharging sinus followed by pruritus was the presenting complaint in most of the patients.

Mangual and Tudu showed in their study, discharge in all the patients and pruritus in 75% of the patients.

In the present study a previous history of burst anorectal abscess was seen in 80% of patients, 8% had recurrent fistula in another, 8% had repetitive diarrhea and 8% had diabetes. Chicken at St. Mark's Hospital London found in their study that 27% of patients had an anal abscess drained and 12% had a history of burst open anal abscess.

Misra and Kapur in their study showed history drainage of anorectal abscess in all the patients. There were recurrent fistulas in 13% of the patients.

In the present study, 88% of the patients had low fistula-in-ano while 12% had high fistula-in-ano.

Deshpande et al. encountered 60% low fistula and 23.5% high anal fistula in their study.

Mangual and Tudu showed prevalence of 65% or low and 35% of high anal fistulae.

Elsenhammer round that majority or fistulae (>90%) occur in the posterior half of anal canal. Misra and Kapur showed in their study that 1609's or the patients had posterior external openings while 40% had anterior external opening. They also found that 94.7% patients had single-external opening and 5.3% of the patients more than one-external opening. Mangual and Tudu found that fistulae were more common in posterior half (72.5%).

In the present study, 60% had right-sided fistula-in-ano and 28% had left-sided fistula-in-ano and 12% had horseshoe fistula-in-ano. Internal opening was palpable only in 44% of the patients. Misra and Kapur showed in their study that it was possible to negotiate the internal opening in 90% of the patients of fistula-in-ano and remaining 10% had internal opening either high up in the anal canal or it is blocked.

Exelyte an oral saline laxative (registered trade mark of Sterling laboratory marketed by USV limited) bowel preparation was given preoperatively along with cefotaxime to almost all the patients.

In the present study, fistulectomy with primary closure was done in 36% of the patients while fistulectomy with wound left open in 60% of the patients. Anal biopsy was taken in one patient (4%) of fistula-in-ano with carcinoma anal canal.

Histopathological examination showed chronic nonspecific inflammation 24 patients and one patient had squamous cell carcinoma grade II.

Malignancy can develop in long standing fistulae in ano and anorectal malignancies can also present with fistulae in ano.

RESULTS
Drainage of anal abscess with fistulotomy can be safely performed in cases of subcutaneous, intersphincteral, or low transsphincteral fistulae with a minimal recurrence rate. However, drainage alone and posterior treatment of the fistula track is recommended for high transsphincteral or suprasphincteral fistulae.

CONCLUSION
Anorectal abscess are quite common in our society, and its early and proper management is very important for complete remission of the disease.
REFERENCES


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A Prospective Study on Clinicopathological Profile of Fungal Rhinosinusitis

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Abstract
Introduction: Kerala being agriculture based state with warm moist climate, favorable for fungal growth and fungal rhinosinusitis (FRS) is relatively common here. This study was conducted to evaluate the clinical and pathological profile of FRS with respect to symptomatology, age group, immunological status, category, risk factors, radiological presentation, treatment regimen, and recurrence.

Materials and Methods: The study was conducted on 50 patients suspected of having FRS and treated as in patients in Government Medical College, Calicut, for 2 years. Clinical, radiological, microscopic, and microbiologic features were documented. Treatment modalities were also evaluated, and patients were followed up at 1 and 3 months.

Results: Out of 50 patients 33 (66%) were diagnosed to have non-invasive FRS which include eosinophilic FRS (50%) and sinus fungal ball in 16%. 12 (24%) patients were with invasive FRS, 5 (10%) with eosinophilic mucin rhinosinusitis among invasive FRS 8 (16%) acute fulminant type, 3 (6%) chronic, and 1 (2%) patient with granulomatous type. 11 out of 12 invasive FRS patients (91.67%) were diabetic. Computed tomography findings were suggestive of FRS in 54% of cases. Patients with invasive FRS underwent surgical debridement and systemic antifungal therapy. Those with non-invasive FRS underwent surgical clearance, and none had any type of recurrence. Aspergillus was found to be the most common pathogen in both groups. Mortality rate in invasive group was 16.67% and 3 had persistent blindness.

Conclusion: FRS is common in warm humid areas. Allergic fungal rhinosinusitis is the most common subtype of FRS associated with allergy. Type 2 diabetes is a major risk factor in acute fulminant invasive fungal sinusitis. Intra orbital and intracranial extension denote poor prognosis. Blindness due to orbital involvement is not reversible even after aggressive treatment.

Key words: Allergic fungal rhinosinusitis, Eosinophilic mucin rhino sinusitis, Fungal rhinosinusitis, Invasive fungal rhinosinusitis, Sinus fungal ball

INTRODUCTION

Chronic rhinosinusitis (CRS) is a common disorder affecting about 20% of the population in India and approximately 31 million people annually.¹ It is defined as any chronic inflammation of mucosal lining of the nose and paranasal sinuses lasting for at least 12 weeks.² Several factors extrinsic and intrinsic contribute for this. Extrinsic etiology may be infection by viral, bacterial, fungal, or allergic which includes both IgE and non-IgE mediated. Intrinsic factors include genetic, autoimmune, or structural causes.³ About 30% of CRS can be attributed to fungal etiology. Fungi are eukaryotic organisms in the ecosystem aiding decomposition and recycling of organic matter, and these exist as yeast or molds.⁴ They produce spores to tide over unfavorable conditions and aids fungal dissemination.³ Under favorable conditions fungal colonization and proliferation occur in the nose and paranasal sinuses leading clinical presentations.⁴ Type of fungal rhinosinusitis (FRS) and associated fungal pathogen vary with geographical distribution. FRS is broadly classified into two major groups; invasive and non-invasive forms. Distinction between these two forms is based on clinical presentation, imaging evidence and or histopathology, also an extension of fungal elements beyond the paranasal sinuses. Non-invasive form typically
presents with chronic sinusitis that fails to respond repeated medical and usual surgical procedures. Acute invasive forms have fever, nasal mucosal ulceration. Chronic invasive disease demonstrates progressive worsening of symptoms with orbital and neurological involvement. Invasive forms are seen in immunocompromised patients. The current definitions require histopathology that shows hyphae in eosinophilic mucin for diagnosis of allergic fungal rhinosinusitis (AFRS) or nonallergic eosinophilic FRS (NAEFRS) rather than positive fungal cultures and the by-products of eosinophils, such as major basic protein. NAEFRS is based on non-IgE mediated immune response to fungus and showed no response to antifungal agents. Causative fungal species is of less importance than host's immunologic response or nonresponse to the fungus. Determination of the fungal species by culture aids in antifungal selection. High index of suspicion is needed for FRS when chronic sinus infection shows resistant to conventional medical therapy. The present study attempts to analyze clinical, radiological, and microscopic features, along with an evaluation of various treatment modalities available for FRS in this setting.

MATERIALS AND METHODS

The present study was conducted in the Department of ENT, Government Medical College, Calicut, from October 2014 to October 2015. Institutional Ethical clearance was obtained for the conduct of the study. All patients with chronic sinus symptoms treated as inpatients were documented with a detailed history, associated comorbidities, imaging studies computed tomography (CT) and magnetic resonance imaging (for intracranial and orbital extension), microbiology, histopathology, and treatment regimen.

RESULTS

Among the 50 patients symptoms were nasal obstruction in 78%, nasal discharge in 56%, headache in 56%, facial pain in 14%, allergy in 14%, postnasal discharge in 14%, proptosis in 7%, bleeding from nose in 6%, diminished vision 6%, diplopia in 2%, ptosis in 2%, fever in 2%. All patients with proptosis, diplopia, ptosis, diminished vision, fever belonged to the invasive type of FRS. 11 patients (69%) with Type 2 diabetes mellitus had invasive FRS. Other factors contributing immunosuppression were not found out. Clinical examination showed nasal discharge in 60%, polyp 42%, peripheral nervous system tenderness in 32%, ophthalmoplegia in 14%, defective vision in 12%, cranial nerve palsy in 12%, nasal ulceration crusting 10%, proptosis in 10%, and orbital cellulitis in 6%. All patients with polyps belonged to eosinophilic FRS. No significant correlation was seen between erythrocyte sedimentation rate (ESR) level and type of FRS though 20% had elevated ESR. 50% patients had eosinophilia and allergy with eosinophilic FRS. 54% of cases showed positive CT radiological finding diagnostic of AFS. All 8 patients with fungal ball showed heterodensity of sinus. 14 out of 30 (46%) of AFRS patients also showed heterodensity. 9 patients had orbital extension, 4 had intracranial extension, 2 had orbit with cavernous sinus involvement, and all were invasive type of FRS. 38 patients (76%) underwent surgery alone whereas 12 (24%) underwent surgery and antifungal therapy and the latter belonged to the invasive type of FRS. 27 patients underwent unilateral FESS, 12 bilateral FESS, and 10 cases of endoscopic debridement for invasive FRS, and 1 Caldwell Luc surgery. 41 patients (82%) needed surgical intervention only once. 6 (12%) needed 2 interventions, and all are invasive FRS. others are AFRS group (Table 1).

Table 1 showing the sinuses affected with FRS. Among the sinuses, maxillary and ethmoid sinuses were commonly involved in eosinophilic mucin rhinosinusitis (EMRS). Multiple sinuses were involved in AFRS and EMRS. All specimens were subjected to potassium hydroxide wet mount and fungal culture (Sabouraud’s dextrose agar) incubated at 25-37° for 4 weeks. Table 2 summarizes the distribution of the different fungi in this study.

Absence of growth culture was always not taken as negative but may be due to poor culture techniques. Among 50 patients 12 (24%) had invasive FRS, and 33 (66%) are non-invasive FRS and 5 (10%) had EMRS. Among invasive subtypes, acute 67%, chronic 25%, and granulomatous 8% were found out. Non-invasive subtypes are AFRS in 76% and fungal ball in 24%.

Table 1: The incidence of sinuses involved in the study

<table>
<thead>
<tr>
<th>Sinus affected</th>
<th>Non invasive</th>
<th>Invasive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary</td>
<td>28</td>
<td>5</td>
</tr>
<tr>
<td>Ethmoid</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Sphenoid</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Frontal</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: The distribution of the different fungi in the present study (n=50)

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus</td>
<td>20 (40)</td>
</tr>
<tr>
<td>Penicillium</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Dematiaceous</td>
<td>8 (16)</td>
</tr>
<tr>
<td>No growth</td>
<td>6 (12)</td>
</tr>
<tr>
<td>Mucor</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Rhizopus</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Candida</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Chrysosporium</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Scopulariopsis</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>
DISCUSSION

Human fungal infections are superficial, deep seated/systemic. Opportunistic infection occurs in patients with debilitating diseases as cancer or diabetes, or in whom the physiological state has been upset by immunosuppression. Opportunistic infections are caused by fungi that are avirulent such as *Aspergillus*, penicillium, and *Mucor*. *Aspergillus* fumigatus is the type which causes aspergillosis of lung, paranasal sinus, orbit, etc., mucormycosis is an invasive disease caused by phycymycetes mainly by species of *Rhizopus*, *Mucor*, and *Absidia*. Conditions predisposing to mucormycosis are uncontrolled diabetes, severe neutropenia, long-term use of steroids 3 chronic invasive FRS is suspected in patients with immunocompromised with complications. *Aspergillus flaveus* also the pathogen in such cases and show histologically granuloma with giant cells containing hyphae. 22% of patients were in 5th decade. 75% of IFRS cases belonged to 7th and 8th decade. 50% with AFRS were in the 3rd and 4th decade. This is similar to study conducted by Schuber et al., where they found that AFRS cases were young. 54% of patients were females. There was no statistically significant relationship between sex and type of FRS either. Symptoms of extra nasal spread such as proptosis, diplopia, and diminished vision exclusively seen in invasive FRS. This is in accordance with the study of Chandrasekhar et al., where orbital involvement was seen with invasive fungal sinusitis. All patients with acute fulminant invasive fungal sinusitis (AFIIFS) were diabetic. It was found that patients with poorly controlled diabetes especially DKA were having a risk of invasive mucormycosis. *Aspergillus* (40%) was the most common fungus retrieved similar to study by Vennewald et al. Histopathology is very important for classification of FRS. In the invasive type, histopathology shows widespread necrosis of all involved structures and inflammatory infiltrate consisting of variable numbers of giant cells, lymphocytes and neutrophils depending on the level of host immune competence. Gomori's methenamine silver (GMS) or Periodic acid–Schiff histologic fungal stains highlight fungal hyphae invading mucosa, blood vessels, or bone. *Aspergillus*, *Rhizopus*, and *Mucor* spp. are common offending organisms, but virtually any fungus can be causative. In AFRS with nasal polyps, characteristic inspissated greenish allergic mucin is seen during surgery. H and E stains show hypertrophic, edematous sinus mucosa containing lymphocytes, plasma cells, and eosinophils. Epithelium is often desquamating with basement membrane thickening and no evidence of necrosis, granulomas or giant cells. The extra mucosal allergic mucin is composed of strongly staining masses of numerous eosinophils surrounded by thin eosinophilic mucin where Charcot Leyden crystals can often be seen. GMS staining shows small areas of sparsely scattered fungal hyphae within the mucin but not within the mucosa. In describing FRS, it is important to categorize the types because treatment and prognosis differ with manifestation of the disease. Diagnosis and classification were done taking into consideration of clinical features, radiological findings, fungal culture, and the most important histopathology. The cases with polyposis, allergic mucin and other characteristics suggestive of allergic or nonallergic eosinophilic FRS in whom fungal stain came negative were classified as a distinct category of EMRS. Out of 50 cases, 5 (10%) were categorized as EMRS, 33 cases (66%) were classified under non-invasive, and 12 cases (24%) under invasive FRS. Non-invasive type was further classified into sinus fungal ball and eosinophilic FRS. There were 8 cases (24%) of sinus fungal ball and 25 cases (76%) of AFRS/NAEFRS the most important criteria for the diagnosis of AFRS require elevation of IgE antibodies specific to the fungus found on the culture of eosinophilic mucin containing the fungus there must not be evidence of fungal invasion. Patients with histopathological evidence of AFRS without elevated IgE to fungus are classified as NAEFRS. Levin et al. recently showed that NAEFRS may actually demonstrate local immunity in the absence of systemic elevation of fungal IgE. Invasive type of FRS were further classified into acute fulminant 8 cases (67%), chronic 3 cases (25%), and granulomatous 1 case (8%) granulomatous invasive FRS is rare in the Southern area compared to North India. All invasive FRS patients underwent endoscopic debridement as surgical procedure along with antifungal therapy. Granulomatous case underwent 3 times surgical debridement as for recurrence along with oral itracanazole. Scopulariopsis as the causative agent in FRS is rarely reported in literature. We had one such case who had uncontrolled Type 2 diabetes and orbital involvement at the time of presentation. Patients with AFRS underwent FESS, and oral steroids started after surgery; dose was titrated depending on endoscopic grading system by Kuperberg. None of them received antifungal agents. However, there are individual studies supporting topical and oral antifungal therapy in AFRS. None of our patients had a recurrence during 3 months follow-up period. Endoscopic sinus surgery and clearance of fungal ball and re-establishment of sinus ventilation was done in sinus fungal ball case. This was the gold standard management of *Aspergillus* fungal ball. Most of the patients with invasive disease were given intravenous amphotericin B 0.25-1 mg/kg/day to a total dose of 3 g over 6-8 weeks. In patients with possible renal toxicity, liposomal amphotericin B at a concentration of 3-5 mg/kg/day. This is reserved for clinically proven fungal infection in immunocompromised host with elevated serum creatinine (>2.5 mg/dl) or progression of disease even after maximum dose of standard amphotericin. IV voriconazole was given in invasive aspergillosis was more
effective than amphotericin B for invasive aspergillosis.\textsuperscript{13} The optimal duration of antifungal drug administration for chronic invasive fungal sinusitis is controversial, and reports vary widely depending on the severity of disease from 1 month to more than 15 months. In our series, all patients received antifungal therapy for 3 months. Around 60\% of patients with invasive fungal disease had to undergo surgical debridement more than once. All the patients were followed up for a period of minimum 3 months. Detailed clinical and endoscopic examination was done. AFRS patients were oral steroids, and no recurrence was noted. Persistent disease was noticed in 3 AFIFS patients with orbital involvement. One AFIFS patient with orbital and intracranial extension expired during treatment. Another patient with chronic IFS expired at the end follow-up due to other comorbidities. Thus, patients with orbital and intracranial involvement are less likely to respond to management. In a retrospective review by Parikh,\textsuperscript{14} the overall mortality rate as result of fungal sinusitis was found to be 18\%. In our series, the overall mortality is 4\%, but it is 16.67\% of invasive group alone is considered which is in accordance with the current literature. Vision loss persisted in three patients due to optic neuropathy as result of ischemic vasculitis, where certain types of fungi like \textit{Mucor} species have the propensity of invading blood vessels with consequent thrombosis and ischemia.

**CONCLUSION**

Fungi play a significant role in developing and perpetuating inflammatory disease of the respiratory tract. In this series, we had 50 suspected cases of FRS. Clinical features, radiological features and treatment, prognosis varied according to the subtypes of FRS. FRS is classified as non-invasive and invasive groups. Non-invasive is again into eosinophilic FRS (allergic-AFRS/nonallergic-NAEFRS) and sinus fungal ball. Invasive form is classified as AFIFS, chronic IFS, and granulomatous IFS. AFRS patients are younger age group, while the invasive group was between 6\textsuperscript{th} and 8 decade. Nasal obstruction, discharge and headache were common symptoms. Proptosis, diplopia, defective vision, and ptosis were noticed in invasive disease aggravated by diabetes. CT findings were not characteristic in initial stages but later developed features suggestive of fungal etiology. Fungal ball showed heterodensity of sinus involved. Bone erosion, orbital, and intracranial extension seen in invasive groups. Maxillary and ethmoid sinuses are the most frequently affected sinuses overall, but maxillary, ethmoid and sphenoid are equally affected in invasive disease. AFRS patients are managed by endoscopic sinus surgery, oral and local steroids. Invasive disease required multiple debridements and systemic antifungal agents. \textit{Aspergillus} species were found to be the most fungal agent in both invasive and non-invasive group. There was a case of invasive \textit{Scopulariopsis} which has been reported as very rare in literature.

**REFERENCES**

Drug Utilization Pattern in Ophthalmology: A Observational and Cross-sectional Study

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INTRODUCTION

The World Health Organization (WHO) has defined drug utilization research as the marketing, distribution, prescription, and use of drugs with special emphasis on medical and social consequences.¹ It is essential part of pharmacoepidemiology which describes the extent, nature and determinants of drug exposure with the ultimate aim of rational use of drugs in the population.²,³ The present variations in the drug prescribing pattern, concerns over adverse drug reactions and increase in the price of drugs have increased the importance of drug utilization studies.⁴ Many pharmaceutical preparations are available in the market often with unaffordable cost.⁵ Irrational and inappropriate use of drugs in health-care system observed globally is a major concern.⁶ Therefore, drug utilization pattern needs to be studied carefully to increase therapeutic efficacy, decrease side effects and also to assess the rationality of drug prescription. Previously, only a few studies were conducted to study drug use pattern in ophthalmology in India. Therefore, the present study was conducted to study the drug use in ophthalmology.

MATERIALS AND METHODS

Observational and cross-sectional study was conducted in the Department of Ophthalmology, Acharya Shri Chander College of Medical Sciences, Jammu, for a period of 2 months from month of March to April 2017. 240 patients (with VA 6/6) attending the Ophthalmology Outpatient Department were included in the study. Data analysis was performed using the descriptive statistical methods: Frequencies, percentage, and proportion.

RESULTS: A total of 240 prescriptions of patients were analyzed with the average number of drugs per prescription being 1.69. Single drug was prescribed in 78 (19.22%) patients, 2 drugs were prescribed in 158 (77.83%) patients, and 3 drugs were prescribed in 12 (2.95%) patients. Lubricating eye drops were most commonly prescribed (37.19% [151/406]), followed by antibiotics (31.28% [127/406]) and anti-allergic including steroids, nonsteroidal anti-inflammatory drugs, antihistaminics, decongestants (26.85% [109/406]). Antiglaucoma medications (4.68% [19/406]) were prescribed the least.

CONCLUSION: The present study revealed the trend of prescribing practices of the ophthalmologists of the institute. Lubricating eye drops were prescribed most frequently. Polypharmacy was not common in the department.

Key words: Drug utilization study, Ophthalmology, Outpatient department
disorders were excluded from the study. Patients unwilling to give consent were also excluded from the study. The prescriptions for all consecutive patients attending the OPD for the 1st time (1st time encounter) were included. The filled-in forms were checked for completeness of data and data analysis was performed using the descriptive statistical methods: Frequencies, percentage, and proportion.

RESULTS

A total of 240 prescriptions of patients were analyzed with the average number of drugs per prescription being 1.69. Single drug was prescribed in 78 (19.22%), 2 drugs were prescribed in 158 (77.83%), and 3 drugs were prescribed in 12 (2.95%). Lubricating eye drops were most commonly prescribed (37.19% [151/406]) followed by antibiotics (31.28% [127/406]) and anti-allergic including steroids, nonsteroidal anti-inflammatory drugs (NSAIDs), antihistamines and decongestants (26.85% [109/406]), and antiglaucoma medications (4.68% [19/406]) (Tables 1 and 2).

DISCUSSION

Drugs play a crucial role in human health and in promoting well-being. The availability and affordability of drugs along with their rational use is of utmost importance for rendering effective health care. Misuse of drugs is quite common in the developing countries due to irrational prescribing, dispensing and administration of medications. Our study was an attempt to describe the ophthalmic drug prescribing pattern in a tertiary care teaching hospital in North India. In this perspective, drug utilization study is an important tool in assessing rationality of prescriptions. It emphasizes the need for periodic review and educational intervention in prescribing practices. It is preferable to keep the number of drugs per prescription as low as possible, to reduce the risk of adverse effects, drug interactions, development of bacterial resistance and to decrease the cost of therapy to the patient. Single drug was prescribed in 78 patients (19.22%), 2 drugs were prescribed in 158 patients (77.83%), and 3 drugs were prescribed in 12 (2.95%) patients in our study.

In this study, an average number of drugs per prescriptions was 1.69, which was lower than range reported in the previous studies by Biswas et al. (3.0), Maniyar et al. (2.0), and Nehru et al. (1.8). Thus, polypharmacy was not common in our study. Recently, regulatory authorities of different countries are advocating generic prescribing to cut total health-care cost. Similar endeavor has also been taken up by the local state government.

Lubricating eye drops were most frequently prescribed in the study - 37.19% patients. This could be due to availability of emerging new efficacious drugs in the management of allergic conjunctivitis and dry eye syndrome.

Antibiotics were prescribed in 31.28% patients. Other hospital-based studies in ophthalmology in India, have reported 14-33% encounters with antibiotics in their study. The high use of antibiotics reflects the prevalence of infections in this region. The percentage of prescription of antibiotics in different dosage form was 31.28%, and this corroborated the findings of Maniyar et al. (30.1%), and Nehru et al. (32.3%). According to the WHO, 15-25% prescription with antibiotics is expected in most of the countries where infectious disease is more prevalent.

Antiallergics were prescribed in 26.8% patients. Antiallergics included steroids, NSAIDs, antihistaminics, and decongestants. This indicates the prevalence of allergic conditions of the eyes in the study.

The short period of 2 months for this study might be a limitation to this study because an adequately powered study conducted over a longer time frame would have been more informative. Another major limitation of this study is its inability to consider the associated comorbidities of patients.

CONCLUSION

The present study revealed the trend of prescribing practices of the ophthalmologists of the institute. Lubricating eye drops were prescribed most frequently. Polypharmacy was not common in the department.
REFERENCES


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Role of Laparoscopy in Diagnosing and Staging of Abdominal Malignancies: A Prospective Study

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Abstract

Introduction: In the diagnosis of abdominal/extra-abdominal malignancies, a wide range of non-invasive techniques are available to the present day surgeon. The diagnosis and staging of malignancies have been revolutionized by the advent of non-invasive investigations such as ultrasonography, computed tomography, and magnetic resonance imaging.

Materials and Methods: This study was conducted in 20 patients admitted on routine opd/emergency basis in gmc Jammu as diagnosed/undiagnosed cases of intra/extra abdominal malignancies from October 2011 to October 2013. All patients with suspected abdominal malignancies were included in the study. Patients with severe co-morbidities were excluded from the study. Patients with contraindications for laparoscopic procedures were excluded from the study.

Results: It was seen that staging laparoscopy has a significant role in the management of abdominal malignancies and can improve the outcome in large numbers of patients.

Conclusion: We suggest that staging laparoscopy should be a routine tool in the armamentarium of all surgeons operating on abdominal malignancies. It should be used as a diagnostic tool complimenting other imaging modalities.

Key words: Abdominal, Laparoscopy, Malignancy, Ultrasonography

INTRODUCTION

In the diagnosis of abdominal/extra-abdominal malignancies, a wide range of non-invasive techniques are available to the present day surgeon. The diagnosis and staging of malignancies have been revolutionized by the advent of noninvasive investigations such as ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI). However, a definitive diagnosis is not always possible with non-invasive imaging tests. The management of malignancies is becoming more and more complex comprising surgical resection, investigational neoadjuvant, adjuvant or palliative chemotherapy, or supportive care. Despite an increasingly sophisticated radiological diagnostic armamentarium, many patients with gastric, hepatic, or pancreatic malignancy continue to have the diagnosis of unresectable or metastatic disease made at exploratory laparotomy. For those who do not require palliative procedure, exploration confers little benefit and may be associated with a significant morbidity and mortality affecting both quality and duration of their survival.

However, during the last decade, laparoscopy has replaced open laparotomy as the preferred approach in patients who require surgical diagnosis and staging of cancer. The role of laparoscopy as a biopsy tool is reserved primarily in patients in whom tissue diagnosis is needed to direct therapy but cannot be obtained by image-guided needle biopsy or by endoscopic means. Laparoscopy allows the surgeon to diagnose and obtain information about dissemination of disease and to diagnose patients with equivocal abdominal findings. Laparoscopy has also been used as second-look procedure to evaluate responses to therapy. Surgical laparoscopy offers high accuracy for detecting intra-abdominal small metastasis. Recent studies have suggested that laparoscopy can play a complementary
role in the staging of abdominal malignancies. It has been found to be more sensitive in detecting hepatic, nodal, and peritoneal metastasis than CT and ultrasonography. 

**Aims**
The study was done on 20 patients who suffered from various malignant diseases with the following aims and objectives:
1. For proper staging of preoperatively diagnosed intra- and extra-abdominal malignancies
2. For diagnosis and staging of preoperatively histologically undiagnosed abdominal malignancies
3. To look for any abdominal lesion in case of undiagnosed primary.

**MATERIALS AND METHODS**
The study was conducted in 20 patients admitted on routine OPD/emergency basis in postgraduate department of surgery, Government Medical College, Jammu, as diagnosed/undiagnosed cases of intra-/extra-abdominal malignancies from October 2011 to October 31, 2012. A brief history was taken along with a detailed physical examination (both systemic and local) and a set of investigations, which were then recorded on a predefined and pretested pro forma. All these patients were subjected to ultrasonography, CT, and other imaging modalities. Diagnostic laparoscopy was also performed in all the patients, and whenever possible, a chunk of tissue was taken with punch biopsy forceps which were sent for histopathological examination for more conclusive diagnosis.

**Inclusion Criteria**
1. Patients with intra-abdominal malignancies without distant metastasis on ultrasonography (USG), CT/MRI.
2. Patients with histologically undiagnosed malignancies for obtaining tissue for histological diagnosis.
3. Patients with extra-abdominal malignancies who are having likely chance of intra-abdominal metastasis but not shown/detected by USG, CT/MRI.

**Exclusion Criteria**
1. Those who did not consent for laparoscopy.
2. Those patients in whom preoperative workup had confirmed Stage IV disease.
3. Those patients who had contraindication for pneumoperitoneum such as severe chronic obstructive pulmonary disease and cardiac arrhythmias.

**OBSERVATION**
The age group with maximum number of cases was 51-60 age group followed by 41-50 and 61-70 age groups with the mean age being 53 years.

There were 12 males (60%) and 8 females (40%). The youngest male patient was 21 years of age and the oldest was 70 years of age, so the mean age of male patient being 53.4 years. The youngest female patient was 40 years of age and the oldest was 70 years of age, the mean age of female patient being 52.6 years.

In the study of 20 patients, there were 6 patients of colorectal (30%), 8 of stomach (40%), 4 of gallbladder (GB) malignancies (20%) and two cases of non-Hodgkin’s lymphoma (NHL) (10%).

Out of 18 cases, half were found to be resectable, and the other half were unresectable. About 75% of GB malignancies were found unresectable. For stomach, 50% of malignancies were unresectable. While for colorectal malignancies, 2 (33.3%) out of 6 cases were found unresectable.

After subjecting the patients to diagnostic laparoscopy, it was found that only 5 cases, i.e., 27.7% of patients had liver metastasis. Out of these 5 cases, 2 cases were from stomach and GB each, and only one case was from colorectal malignancy while rest of 13 cases had no hepatic metastasis on staging laparoscopy.

Peritoneal nodules were found in 5 (27.78%) patients with maximum number of cases, i.e., 3 from stomach and one each from colorectal and GB.

Omental nodules were found in 4 (22.22%) patients. All these nodules were found in gastric malignancies only.

Pelvis is one of the most important sites for malignant deposits due to the gravitational effect; it is found on laparoscopy that only 3 patients out of total 18 had pelvic deposits. Moreover, there was one case with positive pelvic metastasis in each group.

Only 1 (5.5%) case, i.e., of GB malignancy had mesenteric nodules.

In GB malignancies, there was upstaging in 3 out of 4 cases (75%). All these were considered resectable, but after laparoscopy, it was found that only one case was resectable while the other 3 were unresectable.

In colorectal malignancies, in Stage II, there was upstaging in 2 cases out of 3 (66.6%), and out of 3, one case was found to be unresectable. While in Stage III, there was upstaging in 2 out of 3 (66.6%), and out of 3, one case was found to be unresectable.

In case of stomach malignancies, in Stage II, there was upstaging in 1 case out of 3 (33.3%), and one out of 3 was found to be unresectable. In Stage III, there was upstaging
in 3 out of 4 (75%), and out of these 4, 3 cases were found to be unresectable (75%), thus preventing unnecessary laparotomy in 75% of cases.

**DISCUSSION**

Our aim was to study the role of diagnostic laparoscopy for staging in abdominal malignancies. Diagnostic laparoscopy was performed in 20 patients admitted to Government Medical College, Jammu, during October 2011–October 31, 2012. Diagnostic laparoscopy was performed in each patient immediately before the planned elective surgery. It resulted in change in the further course of management of significant number of patients and was associated with low morbidity.

Out of 20 cases studied, 12 were male patients and 8 were female patients constituting 60% and 40%, respectively. Patient ranged from 21 years to 70 years with the mean age being 53 years. Maximum patients in our study were in the age group 51-60 followed by 41-50 and 61-70 years. It was observed that abdominal malignancies show increasing trend with age. Studies conducted by Ozmen et al., Muntean et al., and Lehnert et al. also showed that incidence of abdominal malignancies was higher in males as compared to the females and also the incidence increases with age.

In our study, there were 20 cases comprising 8 (40%) cases of stomach tumor, 6 (30%) cases of colorectal, 4 (20%) cases of biliary tract malignancies, and 2 cases of NHL (10%). Similar trend was also seen in the study conducted by Muntean et al.

Liver metastasis was found in 5 (27.7%) cases while 13 cases had no liver involvement on staging laparoscopy (SL). Various studies conducted by Lehnert et al., Muntean et al., and Ozmen et al. revealed that liver metastasis was found in a 12-33% of cases. Moreover, in the study conducted by Muntean et al., it was found that 18 out of 20 cases of colon tumor had liver metastasis with 2 of them being unresectable.4

Peritoneal nodules were found in 5 (27.7%) cases in our study. Mostly, they were seen in patients with stomach malignancies. Only one case of colorectal malignancy and one case of GB malignancy had peritoneal nodules. The previous studies conducted by Muntean et al. and Ozmen et al. have revealed peritoneal nodules in 32.3% and 16.6% cases, respectively. These peritoneal nodules were missed on CT scan and other imaging modalities. SL was found to be most sensitive modality for peritoneal seedlings.

Omental nodules were found in 4 cases, and all the cases were of carcinoma stomach. No GB and colorectal malignancies resulted in omental nodules.

Mesenteric and pelvic nodules are not found commonly and were reported in only 1 and 3 cases, respectively. Pelvic nodules were seen in one case of colorectal malignancy. One case of stomach tumor had secondaries on bilateral ovaries found on staging laparoscopy. Mesenteric nodules were not seen in colorectal and stomach tumors. Only one case of GB malignancy had mesenteric nodule. One case of GB tumor was found to have Krukenberg tumour.5

On SL, 9 cases were deemed resectable and 9 cases as unresectable. Thus, 50% cases were found to be unresectable on SL. These patients were prevented from undergoing unnecessary exploratory laparotomy. Muntean et al. and Hemming et al. in their studies had seen that SL in intra-abdominal malignancies is of value and can prevent futile laparotomies.

Further subdivision according to tumor site revealed 4 cases of stomach malignancies to be unresectable out of total 8 cases (50%). Out of 6 colorectal malignancies, 2 (33.3%) were found unresectable on diagnostic laparoscopy. Out of 4 GB cases, 3 were found to be unresectable (75%). High unresectability of GB malignancy was found in our study due to small sample of patients as well as aggressive nature of GB malignancy.

In our study, 50% of stomach tumors were found to be unresectable.

There were 6 cases of colorectal malignancies which were further comprised of 2 cases of cecum and ascending colon, 2 cases of splenic flexure, and 2 of rectum; only 2 (33.3%) cases were found to be unresectable. While Muntean et al. found in their study that 20% cases were unresectable. Grobmyer et al. in their study on diagnostic laparoscopy before planned hepatic resection for colorectal metastasis found that SL prevented non-therapeutic celiotomy in 10% of patients.

Only 4 cases of extra-hepatocellular tumors were present in our study, out of which 3 were found to be unresectable on SL. Muntean et al. found 50% cases to be unresectable which were found to have extensive spread on SL.

There were total nine, i.e., 50% cases that were found to be resectable on SL and all of them underwent definitive procedure. Two cases of unresectable colorectal tumor underwent colostomy as a palliative procedure.

Mean duration of SL was 18.83 min (10-30 min). It was little higher in unresectable group compared to resectable (20 vs.
17 min respectively) which was found to be significantly different. Muntean et al. in their study had 48 min mean operative time for SL (25-90 min). In this extended study, SL, peritoneal lavage, laparoscopic ultrasonography (LUS), including color Doppler were done resulting in more mean time for SL. Short duration that is based only on inspection of abdominal organ surfaces can be performed very quickly (usually within 10-20 min), can be done through one or two ports, and has good diagnostic accuracy. Extensive procedure includes opening up of lesser sac, assessment of vessels, and LUS.

There was no complication and mortality related to diagnostic laparoscopy itself.

**CONCLUSION**

SL has a very significant role in abdominal malignancies. It is very accurate in assessing peritoneal seeding, hepatic metastasis which was not found on imaging modalities. A short SL performed just before the planned surgical procedure to certify the operability is found to be safe and very effective and need not to be performed as a separate procedure. However, short SL is less sensitive in staging compared to extended SL and use of LUS.

SL is found to be more useful in staging gastric and extra-hepatic biliary tumor when compared to colorectal cancers. It gives additional information regarding extent if the disease intra-abdominally which changes the course of management in significant number of patients. It has a significant impact in decisions regarding the treatment plan in patients. It helps in more careful planning of palliative and resectional procedure in advanced condition. It also spares malignancy patients from unnecessary laparotomies and has an associated decreased morbidity, pain, and faster recovery.

However, as per our own experience and that from the pertinent literature, we suggest that SL should be a routine tool in the armamentarium of all surgeons operating on abdominal malignancies. It should be used as a diagnostic tool complimenting other imaging modalities.

**REFERENCES**

Role of Topical Phenytoin in the Management of Diabetic Foot Ulcers

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Abstract

Introduction: The management of the diabetic foot ulcer (DFU) is largely determined by its severity (grade), vascularity of the limb, and the presence of infection. In India, habits such as walking barefooted, lack of knowledge regarding diabetic foot, hot climate leading to increased perspiration, poor hygiene, poor sanitation, diet which has low proteins, and general poverty have worsened the problem.

Aim: To study the effect of topical phenytoin in the management of DFU.

Materials and Methods: A total of 40 patients with DFU were studied. 20 patients underwent surgical debridement, and conventional povidone-iodine dressing and 20 others received surgical debridement followed by topical phenytoin dressing.

Results: DFU was common in patients with the duration of diabetes 5-10 years >70% belong to Wagner’s Grade 3 and 4 ulcers. On topical application of phenytoin, there was a significant decrease in pain but this was more subjective. There was a decrease in purulent discharge at the end of 1 week and significant negative culture at the end of 2 weeks.

Conclusion: Considering phenytoin in accelerating wound healing it can be used as a safe, effective easy to use and inexpensive management in the treatment of DFU.

Key words: Conventional dressings, Diabetic foot ulcer, Granulation tissue, Topical phenytoin

INTRODUCTION

In this millennium where man has succeeded in deciphering human genetic code, the issue of management chronic wound still continues an enigmatic challenge. Diabetic ulcers, particularly nonhealing types, are one of the most common surgical issues. From time immemorial doctors are trying different methods to treat these kinds of ulcers. The difficulty in a chronic ulcer, is its refusal to heal, whatever management given, especially diabetic ulcers. The notion that ulcers should be kept dry, although still held by a considerable number of clinicians, is steadily losing ground. We now know that ulcers re-epithelialize much faster or develop granulation tissue faster when treated with dressings which allow moist wound healing. We recognize that occluding ulcers does not lead to infection. Many techniques have been tried over the centuries to heal diabetic leg ulcers. Although wound dressings have been used for at least two millennia, there exists no ideal dressing. During the past 2½ decades, a wide range of innovative dressings has been introduced. People have tried various nonconventional topical therapies in wound healing, such as Aloe vera, benzoyl peroxide, collagen, gentian violet, impregnated gauze, topical phenytoin, mercurochrome, oxygen therapy, sugar, and vinegar. Studies have also proven that topical sucralfate promotes healing of decubitus ulcers, venous stasis ulcers, traumatic wounds, burns, and trophic ulcers and was seen to be superior management of diabetic ulcers. Sucralfate, an oral gastrointestinal medication primarily indicated for the treatment of active duodenal ulcers, is also used for the treating gastroesophageal reflux disease and stress ulcers. It shows potential utility in the healing of skin wounds.
Aim
The aim of the study was to study the effect of topical phenytoin in the management of diabetic foot ulcers (DFU).

MATERIALS AND METHODS
This prospective study was Department of Surgery at Tirunelveli Medical College 40 patients with DFU was studied. 20 patients underwent surgical debridement, and conventional povidone-iodine dressing and 20 others received surgical debridement followed by topical phenytoin dressing.

Inclusion Criteria
Patients with DFU with ulcer involvement limiting to the food and DFU of Wagner’s grade from Group 1 (superficial involvement) to Group 4 (gangrene limited to forefoot or heel, DFU with no vascular compromise) were included in this study.

Exclusion Criteria
Patients with diabetic ketoacidosis, poor compliance, vascular compromise, and with Wagner's Grade 5 ulcer (extensive gangrene of foot and leg) were excluded from the study.

RESULTS
Of the 40 DFU patients, the majority of the patients belong to 60-70 years of age and the next common presentation was between 50 and 60 years. Of the 40 patients, 32 patients were male and 8 were female. Of the patients having DFU majority of them had diabetes for 5-10 years. Of the patients, 10 patients had some form of renal dysfunction as elevated renal parameters or USG showing medico renal disease. Of the 40 patients, 26 patients had strict glycemic control with insulin and 14 patients had moderate glycemic control (blood glucose: 200-300 mg).

Of the 40 patients majority of the patients were of Grade 3 and 4 (abscess with osteomyelitis and DFU with forefoot/toe gangrene). Patients presenting with Grade 1 and 2 ulcers are relatively rare (Table 1). The wound swab from DFU showed that most common organism isolated from the wound was proteus (Table 2).

Phenytoin has membrane stabilizing action and hence an analgesic effect (Table 3). At the end of 2 weeks of monitoring of topical phenytoin these were the end results; unhealthy wound-14, healthy granulating tissue-23, ascending infection-Bk amputation-2, and death due to comorbid illness-1. The discharge from the ulcer was observed for 2 weeks, and the following observations were made (Table 4). Wound culture and sensitivity were seen for the patients on admission and at the end of the 2nd week (Table 5). The healing rate as observed by the formation healthy granulation tissue is given in Table 6.

### Table 1: Grading of ulcer

<table>
<thead>
<tr>
<th>Grades of ulcer</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>1</td>
</tr>
<tr>
<td>Grade 2</td>
<td>10</td>
</tr>
<tr>
<td>Grade 3</td>
<td>17</td>
</tr>
<tr>
<td>Grade 4</td>
<td>12</td>
</tr>
</tbody>
</table>

### Table 2: Microbial culture

<table>
<thead>
<tr>
<th>Organism isolated</th>
<th>Number of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteus</td>
<td>18</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>10</td>
</tr>
<tr>
<td>Staphylococci</td>
<td>8</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>4</td>
</tr>
</tbody>
</table>

### Table 3: Regression of pain

<table>
<thead>
<tr>
<th>Assessment day</th>
<th>Treatment group</th>
<th>Severe pain</th>
<th>Bearable pain</th>
<th>No pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission day</td>
<td>Phenytoin group</td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>15</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Day 7</td>
<td>Phenytoin group</td>
<td>9</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>12</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Day 14</td>
<td>Phenytoin group</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>8</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 4: Clearance of ulcer discharge

<table>
<thead>
<tr>
<th>Assessment day</th>
<th>Treatment group</th>
<th>Purulent discharge</th>
<th>Serous discharge</th>
<th>No discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission day</td>
<td>Phenytoin group</td>
<td>17</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>16</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Day 7</td>
<td>Phenytoin group</td>
<td>10</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>14</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Day 14</td>
<td>Phenytoin group</td>
<td>2</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Control group</td>
<td></td>
<td>8</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 5: Wound culture test

<table>
<thead>
<tr>
<th>Assessment day</th>
<th>Wound C&amp;S</th>
<th>Phenytoin group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission day</td>
<td>Positive for organisms</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>End of 2 weeks</td>
<td>No growth in culture</td>
<td>11</td>
<td>6</td>
</tr>
</tbody>
</table>

### Table 6: Healthy granulation tissue formation rate

<table>
<thead>
<tr>
<th>Assessment day</th>
<th>Presence of HEALTHY Granulation tissue</th>
<th>Phenytoin group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission day</td>
<td>Yes</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Day 7</td>
<td>Yes</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Day 14</td>
<td>Yes</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>
DISCUSSION

Phenytoin has been investigated as a treatment for more than 100 diseases. Numerous allergy and proliferative, idiosyncratic cutaneous side effects have been reported with its use. A frequent observed and unwanted side effect of phenytoin, an anticonvulsant medication, is gingival hyperplasia, especially in children. This side effect suggested that phenytoin can induce the growth of connective tissue, and may have the ability to promote wound healing. In 1939, Kimball and Horan first observed that gingival hyperplasia occurred in some patients treated with phenytoin. This stimulated the first controlled clinical trial in 1958, which found that the periodontal patients with surgical wounds who were pretreated with oral phenytoin had less inflammation, less pain, and accelerated healing when compared with controls. Phenytoin promotes wound healing by following mechanisms: Stimulation of fibroblast proliferation, enhancing the formation of granulation tissue, decreasing collagenase activity, inhibition of glucocorticoid activity, direct or indirect antibacterial activity by affecting inflammatory cells, neovascularization and phenytoin increase gene expression of the platelet-derived growth factor β chain in macrophage and monocytes. It is not known if phenytoin has intrinsic antibacterial activity, or whether the effect of phenytoin on the bacterial load of wounds is mediated indirectly by effects on inflammatory cells and neovascularization.

CONCLUSION

In our present study, it was concluded that the rate of granulation tissue formation, overall graft survival and patient compliance was better in topical phenytoin dressing group as compared to conventional dressing group. Topical phenytoin has a role in the healing of diabetic ulcer by decreasing the pain and decreasing the purulent discharge and early formation of granulation tissue. Surgical debridement and glycemic control remain the cornerstones in the treatment of DFU. Considering phenytoin in accelerating wound healing it can be used as a safe, effective easy to use and inexpensive management in the treatment of DFU.

REFERENCES


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Study of Blood Pressure in Rural and Urban Population of Jamshedpur (Jharkhand)

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Classification of BP for adults aged 18 years or more (Joint National Committee-7 guidelines for classification and management of hypertension in adults).²

<table>
<thead>
<tr>
<th>BP classification</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120 and</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Pre-hypertension</td>
<td>120-139 or</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage I</td>
<td>140-159 or</td>
<td>90-99</td>
</tr>
<tr>
<td>Hypertension</td>
<td>&gt;160 or</td>
<td>&gt;100</td>
</tr>
<tr>
<td>State II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BP: Blood pressure

INTRODUCTION

The blood pressure (BP) level at which a person can be labeled hypertensive remains unsettled till today. Since there no dividing line between normal and high BP, arbitrary levels have been established to define those who have an increased risk of developing a morbid cardiovascular events and/or will clearly benefit from the medical therapy. These definitions should consider not only the level of diastolic and systolic pressure but also age, sex, and race.¹,⁶

When hypertension is suspected, BP should be measured at least twice during two separate examination after the initial examination.

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The relationship between BP and risk of CVD event is continuous, consistent, and independent of other risk factors. The higher the BP, the greater the chance of myocardial infarction, heart failure, stroke, and kidney disease. For individuals aged 40-70 years, each increment of 20 mmHg in systolic or 10 mmHg in diastolic BP doubles the risk of CVDs. The significance of recognizing the different level of BP in a population is further increased by the fact that hypertension is a preventable as well as treatable condition. Two veterans administration antihypertensive trial and the hypertension detection, and follow-up program have conclusively demonstrated that highly systemized antihypertensive drug treatment significantly reduced the mortality. A number of studies have been concluded on the prevalence of hypertension in India. The one in Rohtak represents the urban population and the other in a village in Haryana to represent rural population in India. The prevalence of hypertension was 59.9 and 69.9 per 1000 in males and females, respectively, in the urban population and 35.5 and 35.9 per 1000 in males and females, respectively, in the rural population. Several other studies have shown difference between urban and rural populations. Some report significant differences among rural and urban women or men only while in other population, rural people had higher. In some studies, no regional or urban/rural differences were seen in systolic or systolic. The Yi Migrant study in 1989 demonstrated an important effect of migration on the prevalence of hypertension and the rise of BP with age in China. Poulter et al. in 1990, also studied the rise of BP in Kenyan Luo migrant. Many studies have been done to determine the difference in mean BP of children (male and female) residing in urban and rural areas. Observed mean systolic and diastolic BP rates were elevated in rural when compared to urban children in both sexes between 10 and 15 year of age. To confirm the effect of environmental influences on the mean BP and the prevalence of hypertension as well as to examine the prevalence of other risk factors such as obesity, physical activity, and cigarette smoking in urban and rural population, we have conducted a population-based study in urban and rural area of Jharkhand (Jamshedpur).

MATERIALS AND METHODS

Study Design
This was a cross-sectional study, study period - January 2016 to December 2016.

Setting
Department of Physiology, MGM Medical College and Hospital, Jamshedpur, for urban and slum urban population, and Juri Rural health center of MGM Medical College for rural population.

Study Tool
Sphygmomanometer and stethoscope, weight - scale, measuring - tape, and study population - 510 people were included in the study, of which 261 were female and 249 were male.

Exclusion Criteria
Participant having any current or previous chronic disease, history of heart disease, and hypertension malignancy.

RESULT
Total numbers of person studied were 510, out of which 210 were from the rural area, 138 from slum urban area, and 160 from urban area.

Out of 210 persons in rural area, 17 persons showed hypertension (8.10%) of 138 slum urban people, 12 persons showed hypertension (8.69%), and in 21 persons (13.12%) out of 160 urban people studied showed hypertension.

This study also shows a correlation of hypertension with higher body mass index (BMI) in upper age groups of urban population.

In rural and urban slum groups, there was lower rise in systolic and diastolic BP with age in both sexes. The rise of BP among rural and urban slum was not found till 40 years of age. The rise is only seen in 5th, 6th, and 7th decades of life.

In the urban area, the BMI and BP, systolic, and diastolic were higher in every decades than in rural and urban slum groups. There was a consistent rise in BP with age and BMI.

The rise in BMI with age among upper classes that was strikingly absent among the rural and urban slum (Tables 1-10 and Figures 1-11).

<table>
<thead>
<tr>
<th>Table 1: Composition of participant according to sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>
DISCUSSION

An objective of our study was to find out the level of BP of the selected population sample. We could find a wide range of normal BP values even with the same sex and same age group. However, this is in consonance with that found in literature and as expected the value in younger age groups hover around the mythical 120/80 mmHg. The intragroup variation observed in our studies may be because of many factors, such as hereditary, environment, salt sensitivity, and insulin resistance.

Genetic factors have long been assumed to be important in the production of BP. The inherited multifactorial or monogenic defect is the phenotypic expression of BP.

Table 2: Mean BP in different age groups in rural male population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>40</td>
<td>20.39±2.7</td>
<td>115.4±8.7</td>
<td>75.12±6.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.9-25.5</td>
<td>90-130</td>
<td>60-80</td>
</tr>
<tr>
<td>30-39</td>
<td>27</td>
<td>21.07±2.3</td>
<td>114.03±1.4</td>
<td>76.37±6.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.1-25.60</td>
<td>95-130</td>
<td>70-100</td>
</tr>
<tr>
<td>40-49</td>
<td>21</td>
<td>22±4.66</td>
<td>125.95±17.27</td>
<td>79.6±7.5</td>
</tr>
<tr>
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<td></td>
<td>15.1-36.7</td>
<td>100-170</td>
<td>70-79</td>
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<tr>
<td>50-59</td>
<td>8</td>
<td>21.85±3.2</td>
<td>122.5±7.3</td>
<td>72.55±12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.87-26.1</td>
<td>110-130</td>
<td>50-90</td>
</tr>
<tr>
<td>60-69</td>
<td>10</td>
<td>21.34±2.3</td>
<td>127.5±26.3</td>
<td>77.6±19.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.9-23.5</td>
<td>110-190</td>
<td>60-90</td>
</tr>
<tr>
<td>70 and above</td>
<td>55</td>
<td>23.5±5.06</td>
<td>167.5±13.28</td>
<td>103±10.8</td>
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<td>15.9-24.8</td>
<td>155-185</td>
<td>94-100</td>
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</table>

Table 3: Mean BP in different age groups in rural female population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>36</td>
<td>21.45±1.06</td>
<td>114.13±7.09</td>
<td>72.88±5.6</td>
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<td>15.28-24.2</td>
<td>100-130</td>
<td>60-80</td>
</tr>
<tr>
<td>30-39</td>
<td>29</td>
<td>21.13±2.6</td>
<td>116±9.1</td>
<td>75.6±10.45</td>
</tr>
<tr>
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<td></td>
<td>17.28-25.64</td>
<td>95-130</td>
<td>60-90</td>
</tr>
<tr>
<td>40-49</td>
<td>15</td>
<td>20.4±3.56</td>
<td>114.7±14.1</td>
<td>73.57±7.4</td>
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<td>90-130</td>
<td>60-90</td>
</tr>
<tr>
<td>50-59</td>
<td>11</td>
<td>21.06±3.6</td>
<td>145±34.76</td>
<td>87.27±1.40</td>
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<td>16.6-27.5</td>
<td>120-220</td>
<td>70-100</td>
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<tr>
<td>60-69</td>
<td>5</td>
<td>20.18±3.52</td>
<td>132.2±12.4</td>
<td>83.2±11.8</td>
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<td></td>
<td></td>
<td>15.1-25.06</td>
<td>125-150</td>
<td>70-100</td>
</tr>
<tr>
<td>70 and above</td>
<td>5</td>
<td>23.09±4.1</td>
<td>138±31.14</td>
<td>84±11.40</td>
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<td></td>
<td></td>
<td>15.98-24.8</td>
<td>130-180</td>
<td>70-90</td>
</tr>
</tbody>
</table>

Table 4: Mean BP in different age groups in urban slum male population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>17</td>
<td>20.28±2.1</td>
<td>110.71±2.3</td>
<td>72.5±7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.09-24.7</td>
<td>70-126</td>
<td>60-80</td>
</tr>
<tr>
<td>30-39</td>
<td>20</td>
<td>22±2.18</td>
<td>116.25±6.7</td>
<td>76.25±6.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.2-25</td>
<td>110-120</td>
<td>60-90</td>
</tr>
<tr>
<td>40-49</td>
<td>11</td>
<td>20.6±5.8</td>
<td>120.8±8.7</td>
<td>77.8±7.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.7-42.2</td>
<td>110-140</td>
<td>71-90</td>
</tr>
<tr>
<td>50-59</td>
<td>7</td>
<td>23±3.75</td>
<td>132±22</td>
<td>74.2±9.75</td>
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<td>19.48-24.69</td>
<td>110-140</td>
<td>70-90</td>
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<tr>
<td>60-69</td>
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<td>22.5±1.9</td>
<td>150±24.7</td>
<td>82.5±7.55</td>
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<td></td>
<td>20.2-24.8</td>
<td>120-150</td>
<td>70-90</td>
</tr>
<tr>
<td>70 and above</td>
<td>4</td>
<td>22.79±2.8</td>
<td>133.7±14.93</td>
<td>67.5±5</td>
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<td></td>
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<td>19.93-23.32</td>
<td>115-150</td>
<td>80-90</td>
</tr>
</tbody>
</table>

BP: Blood pressure, SD: Standard deviation
Considering this, it seems natural that the BP will not have any fixed value.

Environmental factors, such as salt intake, obesity, occupation, alcohol intake, family size, and crowding all have their influence on BP. A physician has therefore little choice than starting intervention for hypertension form the arbitrary value of 140/90 mmHg. Be a physician or a physiologist, he has to depend on the working definition of hypertension as the BP, which when left untreated has the likelihood of developing morbid cardiovascular event and/or that will clearly benefit form medical therapy.

Salt intake influences BP and there is a wide variation in salt intake. This is further compounded by the variable Renin level. Insulin level has its role to play as well. Therefore,

### Table 5: Mean BP in different age groups in urban slum female population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>26</td>
<td>20.5±8</td>
<td>113.3±8.5</td>
<td>72.9±7.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.10-23.8</td>
<td>100-130</td>
<td>60-80</td>
</tr>
<tr>
<td>30-39</td>
<td>29</td>
<td>22.2±2</td>
<td>115.85±7.8</td>
<td>74±7.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.85-25.23</td>
<td>100-130</td>
<td>60-90</td>
</tr>
<tr>
<td>40-49</td>
<td>12</td>
<td>21.4±3.5</td>
<td>1229±9.9</td>
<td>76.8±7.64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.5-27.4</td>
<td>104-140</td>
<td>60-90</td>
</tr>
<tr>
<td>50-59</td>
<td>5</td>
<td>21.5±2.13</td>
<td>1251±10</td>
<td>78±4.89</td>
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<td>17.9-23.2</td>
<td>115-140</td>
<td>60-90</td>
</tr>
<tr>
<td>60-69</td>
<td>5</td>
<td>21.08±3.4</td>
<td>1291±9.3</td>
<td>78.3±11.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.4-24.4</td>
<td>104-160</td>
<td>60-80</td>
</tr>
<tr>
<td>70 and above</td>
<td>3</td>
<td>23.04±3.74</td>
<td>136.62±5.8</td>
<td>76.6±5.7</td>
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<tr>
<td></td>
<td></td>
<td>19.2-26.7</td>
<td>120-170</td>
<td>70-80</td>
</tr>
</tbody>
</table>

BP: Blood pressure, SD: Standard deviation

### Table 6: Mean BP in different age groups in urban male population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>25</td>
<td>21.91±2.6</td>
<td>120.76±10.52</td>
<td>794±0.08</td>
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<tr>
<td></td>
<td></td>
<td>18-25.1</td>
<td>110-160</td>
<td>70-90</td>
</tr>
<tr>
<td>30-39</td>
<td>24</td>
<td>22.24±2.6</td>
<td>118.54±9.9</td>
<td>78.95±6.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.8-30.8</td>
<td>110-140</td>
<td>70-90</td>
</tr>
<tr>
<td>40-49</td>
<td>13</td>
<td>23.89±3.4</td>
<td>126.3±12.6</td>
<td>81.5±8</td>
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<td></td>
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<td>17-31</td>
<td>100-150</td>
<td>70-100</td>
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<tr>
<td>50-59</td>
<td>14</td>
<td>22.5±3.7</td>
<td>132±20.3</td>
<td>83.07±10.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.6-25.6</td>
<td>110-180</td>
<td>70-100</td>
</tr>
<tr>
<td>60-69</td>
<td>5</td>
<td>20.28±2.76</td>
<td>134±2.6</td>
<td>82±10.95</td>
</tr>
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<td></td>
<td>18.2-24.4</td>
<td>100-160</td>
<td>70-100</td>
</tr>
<tr>
<td>70 and above</td>
<td>3</td>
<td>29.13±13.2</td>
<td>140±17.32</td>
<td>90±10</td>
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<td></td>
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<td>21.7-44.4</td>
<td>120-150</td>
<td>80-100</td>
</tr>
</tbody>
</table>

BP: Blood pressure, SD: Standard deviation

### Table 7: Mean BP in different age groups in urban female population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No. of cases</th>
<th>Body mass index±SD with range</th>
<th>Mean systolic BP (mmHg)±SD with range</th>
<th>Mean diastolic BP (mmHg)±SD with range</th>
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</thead>
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<tr>
<td>20-29</td>
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<td>77.72±6.85</td>
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<td>100-160</td>
<td>70-90</td>
</tr>
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<td>30-39</td>
<td>23</td>
<td>21.9±3.1</td>
<td>120.21±1.1</td>
<td>75.9±6.7</td>
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<td>17.31-26.3</td>
<td>110-150</td>
<td>70-90</td>
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<tr>
<td>40-49</td>
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<td>19-30</td>
<td>110-140</td>
<td>70-100</td>
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<td>50-59</td>
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<td>22.07±2.76</td>
<td>125.5±21.1</td>
<td>82.5±6.34</td>
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<td>110-140</td>
<td>70-90</td>
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<tr>
<td>60-69</td>
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<td>27.90±9.1</td>
<td>145.25±20.5</td>
<td>84.62±9.98</td>
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<td>24-46.6</td>
<td>110-130</td>
<td>80-100</td>
</tr>
<tr>
<td>70 and above</td>
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<td>25.1±4.8</td>
<td>140±20</td>
<td>90±10</td>
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<td>20.4-30.1</td>
<td>120-160</td>
<td>80-100</td>
</tr>
</tbody>
</table>

BP: Blood pressure, SD: Standard deviation
variable BP level should be taken as a rule rather than an exception.

Our study has also pointed out an association of raised BMI with hypertension. The numbers of hypertensive were more in cities, and some of them incidentally are having higher BMI. Obesity is a cause of hypertension and reduction of obesity causes lowering of BP and also lowers a risk of atherosclerosis. It is difficult to find out whether the hypertension of urban people was solely due to higher BMI, that is obesity, or some other factors. However, in our studies, the BMI was not that higher as to be labeled as frankly obese and their body weight not much higher. Thus, although the date is insufficient, it seems probable that factors other than obesity were responsible for hypertension or higher normal BP in urban population, as compared to their rural counterparts.

A fact that should be borne in mind is that the urban population, especially people of higher socioeconomic class has now become health conscious and have learned to avoid the known risk factors of hypertension, that is, obesity, diabetes, hypercholesterolemia, and hyperlipidemia. Restriction is done to diets, exercise undertaken, cigarettes given up, limit is done to alcohol, yoga, and various other healthy practices followed. Thus, our three groups had not

Table 8: Prevalence of hypertension in rural, slum urban, and urban population

| Total no. of participants in Rural area=210 | No. of participants showing blood pressure blood pressure 140/90 mmHg and above=17 | Percentage=8.01% |
| Total no. of participants in slum rural area=136 | No. of participants showing blood pressure blood pressure 140/90 mmHg and above=12 | Percentage=8.69% |
| Total no. of participants in urban area=160 | No. of participants showing hypertension=21 | Percentage=13.12% |

Table 9: Mean systolic blood pressure according to age, sex, and area urban and urban population

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No.</th>
<th>Mean BP±SD in rural people</th>
<th>No.</th>
<th>Mean BP±SD in slum rural people</th>
<th>No.</th>
<th>Mean BP±SD in urban people</th>
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</thead>
<tbody>
<tr>
<td>Men</td>
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<td></td>
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<tr>
<td>20-29</td>
<td>40</td>
<td>115.4±8.7</td>
<td>17</td>
<td>110.7±12.3</td>
<td>25</td>
<td>120.76±10.52</td>
</tr>
<tr>
<td>30-39</td>
<td>27</td>
<td>114.03±1.4</td>
<td>20</td>
<td>116.25±6.7</td>
<td>24</td>
<td>118.54±9.9</td>
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<td>40-49</td>
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<td>125.95±17.2</td>
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<td>120.8±8.7</td>
<td>13</td>
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<td>127.5±26.3</td>
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<td>150±24.7</td>
<td>5</td>
<td>134±26</td>
</tr>
<tr>
<td>70 and above</td>
<td>5</td>
<td>167.5±13.28</td>
<td>4</td>
<td>133.75±14.9</td>
<td>5</td>
<td>140±17.32</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>36</td>
<td>114.13±7.09</td>
<td>26</td>
<td>113.3±8.5</td>
<td>22</td>
<td>121.13±13.1</td>
</tr>
<tr>
<td>30-39</td>
<td>29</td>
<td>116±9.1</td>
<td>20</td>
<td>115.85±7.8</td>
<td>23</td>
<td>120.21±11.1</td>
</tr>
<tr>
<td>40-49</td>
<td>15</td>
<td>114.7±14.1</td>
<td>12</td>
<td>122±9.9</td>
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<td>127±11.5</td>
</tr>
<tr>
<td>50-59</td>
<td>11</td>
<td>145.34±76.7</td>
<td>5</td>
<td>125±10</td>
<td>10</td>
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</tr>
<tr>
<td>60-69</td>
<td>5</td>
<td>132±12.4</td>
<td>6</td>
<td>129±19.3</td>
<td>8</td>
<td>145.2±20.5</td>
</tr>
<tr>
<td>70 and above</td>
<td>5</td>
<td>138±31.14</td>
<td>3</td>
<td>136.6±25.8</td>
<td>3</td>
<td>140±20</td>
</tr>
</tbody>
</table>

BP: Blood pressure; SD: Standard deviation

Table 10: Mean systolic blood pressure according to age, sex, and area

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>No.</th>
<th>Mean BP±SD in rural people</th>
<th>No.</th>
<th>Mean BP±SD in slum rural people</th>
<th>No.</th>
<th>Mean BP±SD in urban people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>40</td>
<td>75.12±6.7</td>
<td>17</td>
<td>72.5±7.3</td>
<td>26</td>
<td>79±4.08</td>
</tr>
<tr>
<td>30-39</td>
<td>27</td>
<td>76.37±6.7</td>
<td>20</td>
<td>76.25±6.2</td>
<td>20</td>
<td>78.95±6.5</td>
</tr>
<tr>
<td>40-49</td>
<td>21</td>
<td>79.6±7.5</td>
<td>11</td>
<td>77.8±7.4</td>
<td>12</td>
<td>81.53±8</td>
</tr>
<tr>
<td>50-59</td>
<td>8</td>
<td>72.5±12</td>
<td>7</td>
<td>74.2±9.7</td>
<td>5</td>
<td>83.07±10.3</td>
</tr>
<tr>
<td>60-69</td>
<td>10</td>
<td>77.6±5.17</td>
<td>7</td>
<td>82.85±7.5</td>
<td>6</td>
<td>82±10.95</td>
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<tr>
<td>70 and above</td>
<td>5</td>
<td>103±10.8</td>
<td>4</td>
<td>87.5±5</td>
<td>3</td>
<td>90±10</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>36</td>
<td>72.8±5.6</td>
<td>26</td>
<td>72.9±7.9</td>
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<td>77.72±6.85</td>
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<td>30-39</td>
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<td>40-49</td>
<td>15</td>
<td>73.57±7.4</td>
<td>12</td>
<td>76.8±7.63</td>
<td>10</td>
<td>80.54±9.5</td>
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<tr>
<td>50-59</td>
<td>11</td>
<td>87.27±11.4</td>
<td>5</td>
<td>78.4±8.9</td>
<td>10</td>
<td>82.5±6.34</td>
</tr>
<tr>
<td>60-69</td>
<td>5</td>
<td>83.2±11.8</td>
<td>6</td>
<td>78.3±11.69</td>
<td>8</td>
<td>84.62±9.98</td>
</tr>
<tr>
<td>70 and above</td>
<td>5</td>
<td>84±11.40</td>
<td>3</td>
<td>76.6±5.7</td>
<td>3</td>
<td>90±10</td>
</tr>
</tbody>
</table>

BP: Blood pressure; SD: Standard deviation
had the same environmental background. This could well be reason of still not higher prevalence of hypertension and higher normal BP in the urban upper socioeconomic group.

Higher BP was recorded in the rural male population of age over 70, however that was not found in rural female population of age above 70. It is difficult to explain the reason of such variation, under the limited scope, and resources of our study. However, we predict that rural poverty and negligence have certain role to play. In comparable urban group, medical attention would have been sought and BP brought under control.
rural population, such group is not possibly aware of his hypertension and presented themselves as normal. A significant rise of BP was reported by Joshi et al. in rural community due to operation of some lifestyle risk factors, but such factors were inoperative in our studies and lack of awareness of underlying disease seems to be dominant factor behind excessive rise of BP in rural post-70 males. 

The change in arterial BP is one of the generally known physiological changes in aging of man. A continuous increase in BP levels during adulthood is one of the major health concerns in all modern societies. Aging causes structural, functional, and biochemical changes in the body and these changes, in turn, are influenced by various environmental and genetic factors. There are many studies on this aspect of BP, and our result that BP increases with age is in conformity with Padmavat et al. (1959), Gupta et al. (1979), and Rao et al. (1979 and 1980) of our country. 

Further, it is also observed that age has more influence on systolic BP rather than diastolic BP unlike the reports of Mahalakshmi. However, the difference between the systolic and diastolic BP that we observed was small.

There have been studies on tribal communities in various parts of the world where there was no or little increase in adult BP (Maddoxs, 1961; Lowenstein, 1961). However, some of the tribal population group which migrate to urbanized areas or undergo modernization or change in their occupation, in situ, have shown tendencies toward an increase in BP with aging (Cruz-Coke et al., 1964; Prior 1970). However, similar studies in our country are very few and we are not in a position to comment on the existence of such variation in any of our hundreds of tribal population.

In our study, significant differences between mean systolic and diastolic BP among urban and rural populations were seen; these associations were independent of age and sex. Mean BP and prevalence of hypertension increased with age in both sexes and both populations. Other studies have also shown that living in urban areas or more Westernized environments increases mean BP and prevalence of hypertension. Other variables such as dietary factors including sodium and potassium intake, obesity, and lower physical activity can account for some, but not all, higher BP found in the urban area. Alcohol intake is an important variable, but it is equally prevalent in urban and rural areas.

The positive gradients in BP have also been identified as function of educations, occupational rank or other measures of socioeconomic position, and psychosocial stress. These socioeconomic gradients are understood as antecedent to a set of more proximate risk factors, such as obesity and dietary Na-K ratio. In our study, the lower ranges of BP in rural setting may be due to the absence of above stressors. The stress in any stimulus or stimuli, experienced consciously or unconsciously, which is potentially harmful or threatening to the individual. The stress may originate in any one of a series of linked open systems physical, psychological, social, and cultural, but spill over and have ramification for the others.

BP values, found in our study, were lower in urban poor slum dwellers when compared with urban higher socioeconomic class, but the value of urban poor was higher than what found in rural setting. This may well be due to intermediate level of stress and environmental variables. Our BP of 3 group data supports the hypothesis that there is a continuous distribution of hypertension
prevalence from lean, low salt, high physical activity so cities to higher BMI, high salt, and low physical activity populations. Social and economic transformations occurring in emerging rural economy of Jharkhand, in the near future will bring the BP level up and closer to urban population. The epidemic is directly related to the pace of development of Jharkhand. As we find, in urban poor slum dwellers, who are mostly migrants from adjacent rural areas, due to their exposure to more risk factors in urban settings have higher BP values. The possibility shows that human being when expose common risk factors demonstrate similar response. There seems that no unique process such as race and ethnicity significantly affects susceptibility to changes in BP and it all depends on the extent of operation of established risk factors.

**CONCLUSION**

Finally, we conclude that the BP of urban population is higher that of rural population in Jharkhand. This study has also shown that BP of the people of Jamshedpur and its neighborhood is in higher range.

**REFERENCES**


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Post Punch Graft Appearance of Repigmentation Time in Stable Vitiligo: A Retrospective Study

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Abstract

Introduction: Vitiligo, characterized by depigmented macules is a common disorder with a high psychosocial impact, particularly in darker skins. Surgical methods become important in cases where medical therapy fails to cause repigmentation. The basic principle of surgical treatment is autologous grafting of viable melanocytes from pigmented donor skin to recipient vitiliginous areas. Punch skin graft it is a simple, safe, inexpensive, and quickly responding technique.

Materials and Methods: A retrospective study was conducted in 25 cases of punch skin grafts in stable vitiligo. Age, sex, type of vitiligo, distribution of lesions in various regions of body, and appearance of repigmentation (AOR) time in weeks were analyzed. The study was conducted in the Department of Dermatology, Theni Medical College, Theni, from the data collected from the records of the patients.

Results: A total number of 272 grafts were placed over 15 various regions of body in 25 cases of stable vitiligo patients. The AOR time was quicker in mucosal followed by segmental, focal, and acrofacial vitiligo and was quicker in lips, infraclavicular, and parasternal areas followed by other areas.

Discussion: In our study, we noticed the AOR time is 3.9 weeks (29 days), in parallel with the national and international studies. The sun exposed and highly vascular areas such as lips, nose, scalp, cheek, maxillary area, mandibular, upper interscapular area, and infraclavicular area got the onset pigments very quick when compared to sun hidden and less vascular areas.

Key words: Appearance of repigmentation time, Punch skin graft, Stable vitiligo

INTRODUCTION

Vitiligo is a common depigmenting disorder, characterized clinically by milky white macules and histologically by an absence of functional melanocytes in the affected area. It causes severe cosmetic distress, particularly in darkly pigmented skins and is also associated with a great social stigma. It has a profound psychological impact and greatly affects the quality of life.¹ In 1947, Haxthausen transplanted thin split thickness skin grafts from normal to vitiliginous skin in three cases, to study the pathogenesis of the disease.²,³ In 1964, Behl from India was the first to describe the surgical treatment of vitiligo in a large series of 107 patients with thin Thiersch grafts.⁴,⁵ Falabella described the suction blister technique for repigmentation of vitiligo in 1971, and later the miniature punch grafting technique in 1978.⁶ The basic principle of all surgical methods is transfer of melanocytes from uninvolved skin into a stable leukoderma lesion, where they grow into, and function as, effective epidermal melanin units. “Donor dominance” principle states that, when a graft from normal skin is transplanted to an affected site, the transposed grafted area maintains its integrity and characteristics, independent of the recipient site. When a normal pigmented donor auto punch graft is transplanted onto a depigmented stable vitiligo area, it dominates, and the melanocytes in the mini grafts not only continue to produce melanin but also migrate into the adjacent depigmented epidermis; seen clinically as initial perigraft pigmentation.⁷ Various grafting methods have been described including tissue grafts and cellular grafts. Still, in this era of cellular grafts, punch skin...
graft stands the best for the reason that it is a simple, safe, inexpensive, quickly responding technique with high success rate of repigmentation with no concerns of tumorigenic potentials of some techniques, whereas cellular grafts are expensive, time-consuming and having tumorigenic potentials of some techniques with advantage of smaller donor tissue covering larger recipient area.

MATERIALS AND METHODS

A retrospective study was conducted in 25 cases of punch skin grafts in stable vitiligo. The cases done by the author were collected with case records, and photographs and results were analyzed in the point of age, sex, type of vitiligo, distribution of lesions in various regions of the body, and appearance of repigmentation (AOR) time. The study was conducted in the Department of Dermatology, Theni Medical College, Theni, Tamil Nadu.

A selection criterion was followed while selecting the cases for punch skin graft procedure.
1. “Stable vitiligo” which is stationary and without the development of new lesions in the past 2 years.
2. Patients in whom the lesions were not improving in spite of long medical management.
3. Patients with no history of Koebner phenomenon in the lesions.
4. Patients who do not have keloidal tendency.
5. Patients with no history of bleeding diathesis.

Out of 25 cases of stable vitiligo, 9 were male and 16 were female. Young females were more in the below 20 years age group. Lowest age was 12 years and the upper limit was 50 years (Table 1). On evaluating the types of vitiligo, 15 cases were focal vitiligo, 6 cases were segmental vitiligo, 2 cases were mucosal vitiligo, and 2 cases were acrofacial type (Table 2). The cases which had undergone the following methodology were selected for the study.

Cases were selected according to the selection criteria. Vitiligo lesions of more than 2 years duration with no new depigmentary lesions were considered as “Stable vitiligo.” The patients having a history of Koebnerization, Keloidal tendency, or bleeding diathesis were excluded from selection. Punch graft kit consisted of 2.25 mm punches, graft holding curved forceps, Double curved “S” shaped scissors, graft taking forceps, spreader, stainless steel bowel for harvested grafts, normal saline, framycetin tulle dressing, 1% lignocaine, disposable needle and syringe, cotton, gauge, plaster, and autoclavable aluminum container. 2.5 mm punches are used in donor area and rotated down to the depth of the upper dermis, and required grafts were harvested from the donor area. 2 mm punches are rotated down to mid dermis approximately 1-1.5 mm in depth, and the achromic grafts are taken and discarded. The normal skin grafts already stored were transferred to these punched sites with the assurance of dermal side down by assessing the glistening surface. Spreader is used to spread the grafts. Firm pressure with moist gauze was applied to achieve homeostasis and for a snug fit. Dressing was done with a double layer of framycetin tulle, gauze, and plaster.

Photographs were taken prior and soon after the procedure with grafts in situ and periodically after every 15 days for 2 months and there after every 1 month till the end of 1 year. Patients were requested to report the time of AOR in each case and were recorded in region wise manner and mean was calculated (Table 3).

RESULTS

A total number of 272 grafts were placed over 15 various regions of the body in 25 cases of stable vitiligo patients. Few grafts were displaced from the recipient sites due to trauma during dressing. Otherwise, all the grafts were well taken. In our study, regarding the AOR time, it was quicker in mucosal followed by segmental, focal, and acrofacial vitiligo. Moreover, the AOR time was quicker in lips (2 weeks), followed by upper interscapular area, nose, (2.5 weeks), infraclavicular (3 weeks), (Figures 1-7), parasternal area (3 weeks), cheek (3.5 weeks), maxillary area (3.5 weeks), medial malleolus (4.5 weeks), scalp (4 weeks), forehead (4 weeks), and mandibular area (4 weeks dorsum of hand [4 weeks], fingers [4 weeks], and leg [4 weeks]). The overall mean was calculated as 3.9 weeks that is 27 days (Table 3).

Table 1: Age and sex distribution

<table>
<thead>
<tr>
<th>Age group (year)</th>
<th>10-20 years</th>
<th>21-30 years</th>
<th>31-40 years</th>
<th>41-50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Focal</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Segmental</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Mucosal</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Acrofacial</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
DISCUSSION

The onset of repigmentation (AOR) time was noted and explained by so many authors. Falabella while treating segmental vitiligo observed gradual repigmentation around each autologous mini grafts and ultimate coalescence after 2-3 months. In stable leukoderma, he noticed gradual repigmentation until coalescence in 3-4 months. The first specific mention about AOR time came in 1989 when Falabella observed pigment spread about 1 month after surgery, and full repigmentation in 3-6 months. Among the Indian authors, savant depicted uniform perigraft melanin pigment by 1-1.5 months, in his study. Lahari and Sengupta noticed the AOR time as 21.6 days that is 3.1 weeks. In our study, we noticed the AOR time as

**Table 2: Type of vitiligo**

<table>
<thead>
<tr>
<th>Type of vitiligo</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal</td>
<td>15</td>
</tr>
<tr>
<td>Segmental</td>
<td>6</td>
</tr>
<tr>
<td>Mucosal</td>
<td>2</td>
</tr>
<tr>
<td>Acrofacial</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

**Table 3: Distribution of region and AOR time in weeks**

<table>
<thead>
<tr>
<th>Site of vitiligo</th>
<th>AOR in weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalp</td>
<td>4</td>
</tr>
<tr>
<td>Forehead</td>
<td>4</td>
</tr>
<tr>
<td>Nose</td>
<td>3</td>
</tr>
<tr>
<td>Cheek</td>
<td>3.5</td>
</tr>
<tr>
<td>Maxillary area</td>
<td>3.5</td>
</tr>
<tr>
<td>Mandibular area</td>
<td>4</td>
</tr>
<tr>
<td>Lip</td>
<td>2</td>
</tr>
<tr>
<td>Infraclavicular area</td>
<td>3</td>
</tr>
<tr>
<td>Upper interscapular area</td>
<td>2.5</td>
</tr>
<tr>
<td>Parasternal area</td>
<td>3</td>
</tr>
<tr>
<td>Lumbar</td>
<td>5</td>
</tr>
<tr>
<td>Dorsum of hand</td>
<td>4</td>
</tr>
<tr>
<td>Fingers</td>
<td>4</td>
</tr>
<tr>
<td>Leg</td>
<td>4</td>
</tr>
<tr>
<td>Medial malleolus</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Mean = 3.9 weeks (27 days). AOR: Appearance of repigmentation

**Figure 1: Before punch skin graft infraclavicular**

**Figure 2: 8 days after grafting**

**Figure 3: Closure view after 8 days**

**Figure 4: Infraclavicular punch grafts after 21 days (3 weeks)**
3.9 weeks (29 days) which is little higher than the study conducted by Lahari and Sengupta and near the value of Falabella.\textsuperscript{10,12,13} Sun exposed areas such as lips, nose, scalp, cheek, maxillary area, mandibular, upper interscapular area, and infraclavicular area got the onset pigments very quick when compared to the sun hidden areas such as lumbar, leg and leg medial malleolus areas. Highly vascularized, non glabrous (hairy) areas such as parasternal area, supraclavicular area, scalp, lips, cheek, and fore head areas got the repigmentation quick when compared to nonhairy and less vascular areas like leg and ends of long bones area like lower leg (medial malleolus).

**CONCLUSION**

Punch skin graft technique stands the best for the reason that it is a simple, safe, inexpensive, quickly responding office procedure with high success rate of repigmentation and no concerns of tumorigenic potentials of some techniques. Finally, being an extended biopsy technique, no special training is required. The onset of repigmentation time depends not only on the stability of vitiligo but also on the vascularity of the area of depigmentation and the presence of sun exposure in the area.

**REFERENCES**


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Spectrum of Etiology of Intestinal Obstruction - A Hospital-based Study

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Abstract

Introduction: Bowel obstruction remains one of the most common intra-abdominal problems of utmost complexity faced by general surgeons despite better understanding of altered physiology in disease and improved surgical techniques.

Aim: The aim is to study the epidemiology, incidence, management, and outcomes of intestinal obstruction.

Materials and Methods: This study comprises of 118 patients of acute small and large bowel obstruction managed in a single surgical unit in the Department of Surgery, Government Medical College, Jammu, over 12 months. The diagnosis of intestinal obstruction was made based on detailed history, clinical examination, radiological examination (usually plain X-ray abdomen), and histopathology of the excised gut lesion. Special investigations including contrast studies and contrast-enhanced computed tomography abdomen were done in selected patients only. Patients of gastric outlet obstruction and anorectal malformation were excluded from the study.

Results: Acute intestinal obstruction comprised of 5.77% of total number of admissions, age spectrum ranging from 2 days to 82 years with peak incidence in the age group of 30-50 years (28.81%). Males were more commonly affected in all age groups with male-to-female ratio 1.6:1. Small bowel involvement was observed in 78.9% and large bowel in 21.1% of these patients. The most common cause of intestinal obstruction was found to be bands and adhesions (40%), followed by non-specific cases (13%), hernias (8.5%), and bolus obstruction (6%).

Conclusion: Adhesions are the most common cause of bowel obstruction. The treatment in each patient should be individualized. A trial of conservative management should be planned in all cases before embarking to a surgical intervention except in patients where strangulation is suspected.

Key words: Adhesion, Improved surgical techniques, Intestinal obstruction

INTRODUCTION

A wide range of pathologies can inflict both the small and large intestines. Intestinal obstruction accounts for approximately 15% of all emergency department visits for acute abdominal pain.¹ Intestinal obstruction can be broadly differentiated into small bowel and large bowel obstruction. The most common causes of intestinal obstruction include adhesions, neoplasms, and herniation. Adhesions resulting from prior abdominal surgery are the predominant cause of small bowel obstruction, accounting for approximately 60% of cases.² Less common causes of obstruction include intestinal intussusception, volvulus, intra-abdominal abscesses, gallstones, and foreign bodies.³ The hallmarks of intestinal obstruction include colicky abdominal pain, nausea and vomiting, abdominal distension, and a cessation of flatus and bowel movements. Diagnosis of such patients should include initial evaluation of clinical signs and symptoms, radiography, complete blood counts, and metabolic panel. Radiography accurately diagnoses intestinal obstruction in approximately 60% of cases,² and its positive predictive value approaches 80% in patients with high-grade intestinal obstruction.⁴ Management of intestinal obstruction is directed at correcting physiologic derangements caused by the obstruction, bowel rest, and removing the source of...
obstruction and includes intravenous fluid resuscitation with isotonic fluid and antibiotics. With conservative management, resolution generally occurs within 24-48 h. Beyond this time frame, the risk of complications, including vascular compromise and increased surgical evaluation is required followed by histopathologic examination of all excised specimen to confirm the diagnosis.

In the present study, the epidemiology among hospital admissions, as well as management, complications, and outcome of intestinal obstruction in our setup has been reported.

**MATERIALS AND METHODS**

This study comprised of 118 cases of acute small and large bowel obstruction managed in a single surgical unit in Government Medical College, Jammu, over 12 months. Patients of anorectal malformation and gastric outlet obstruction were excluded. The diagnosis of acute intestinal obstruction was made in these cases by detail history, clinical examination, and radiological investigation and histopathological examination. Contrast studies including contrast-enhanced computed tomography abdomen were done in selected patients.

Initially, the conservative treatment with intravenous fluids, nasogastric suction, and broad-spectrum antibiotics were administered. In case of complications, surgical intervention was done. The operative procedure in these patients was individualized depending on the peroperative findings, whether the gut was viable or gangrenous. In cases with strangulation obstruction, the gangrenous gut was excised and continuity restored by end-to-end anastomoses or stoma formation. In simple obstruction, the procedure was limited to the release of gut and taking of tissue for biopsy if considered so at the time of surgery. All these cases were carefully managed post-operatively by restricting or avoiding oral feeds, RT suctioning and judicious use of intravenous fluids duration, of which depended on the peroperative findings, whether the gut was viable or gangrenous. In cases with strangulation obstruction, the gangrenous gut was excised and continuity restored by end-to-end anastomoses or stoma formation. In simple obstruction, the procedure was limited to the release of gut and taking of tissue for biopsy if considered so at the time of surgery. All these cases were carefully managed post-operatively by restricting or avoiding oral feeds, RT suctioning and judicious use of intravenous fluids duration, of which depended on the peroperative findings, whether the gut was viable or gangrenous.

Patients were allowed orally only when intestines started functioning by passage of flatus or stools or functioning if stoma. Post-operatively, antibiotics were used in all cases. Special emphasis was laid on preventing post-operative respiratory and venous complications by early ambulation of patients.

**RESULTS**

The total number of admissions during the 1-year study period in our surgical unit was 2044 cases, of which 118 (5.77%) cases of acute intestinal obstruction were treated. The age-spectrum ranged from 2 days to 82 years. The study showed the peak incidence in the age group 30-39 (15.25%) and 50-59 years (13.56%). The mean age in the current study was 33.2 years. This study included 73 male patients (61.86%) and 45 female patients (38.14%) with male-to-female ratio being 1.6:1. Males were more commonly affected as compared to females in all the age groups Table 1.

Most common symptom was found to be pain abdomen (85%) of the cases followed by vomiting (83%), distension (81%), and constipation (54%). Most common signs observed were tachycardia (80%) and visible intestinal peristalsis (60%). The rectal examination did not reveal any abnormality except in 2 cases (1.69%) of rectal malignancy where rectal growth was felt. The most common cause of intestinal obstruction was post-operative adhesion (39.83%) followed by non-specific causes (12.71%) of all patients. The non-specific group comprised of patients presenting with the clinical and radiological features of intestinal obstruction, but no cause of obstruction was found. Most of these patients were young adults, with maximum number of cases in 30-40 years of age and sex incidence also appeared to be the same (8 males and 7 female patients). None of these patients had a history of previous surgical intervention. All these patients were managed conservatively, average duration of stay in hospital was 2.5 days; however, recurrence was observed in approximately 30% of these patients on follow-up.

The most common cause of intestinal obstruction in our study was post-operative adhesions followed by non-specific cause, hernias and bolus obstruction with intussusception, and Meckel’s diverticulum being the least common. Appendectomy was found to be the most common operation leading to post-operative adhesions (21.28%) followed by laparotomy for DU perforation, LSCS, ileal perforation, ileostomy closure, and hemoperitoneum were among the other common causes in decreasing order of their frequency (Table 2).

Intestinal obstruction due to adhesions was present in 31 males and 16 females. Out of these, 20 patients (42.55%) were managed conservatively and 27 patients (57.45%) required surgical exploration. Most common procedure done was adhesiolysis (100%), as adhesions were present in all of these cases followed by adhesiolysis with release of band 9 patients (33.33%), adhesiolysis with excision of Meckel’s diverticulum was required in 2 patients (7.41%), and adhesiolysis with ileostomy was required in 4 patients (14.81%) due to gangrenous ileum.

Intervention, outcomes, complications, and mortality are given in Tables 3 and 4. Out of 118 patients managed
Acute intestinal obstruction is one of the common life-threatening emergencies all over the world presenting as acute abdomen and requiring surgical intervention. A number of recent studies have found adhesive obstruction to be replacing obstructive hernias as the most common cause. This study is done to explore epidemiology, management, and outcome of cases of intestinal obstruction presented in our institution during 1 year.

In the present study, 118 cases of acute intestinal obstruction were treated with an incidence of 5.77% (118/2044 cases in surgery unit). The age spectrum ranged from 2 days to 82 years with a mean age of 33.2 years. This study included 73 male patients (61.86%) and 45 female patients (38.14%) with male-to-female ratio being 1.6:1. Males were more commonly affected as compared to females in all the age groups.

Adhkari et al. did a study and found the incidence of acute intestinal obstruction to be 9.8% (367/3717), whereas mean age of 41.7 years. Male-to-female ratio was 1.9:1 with male (75.2%) and females (24.8%). Ullah et al. in their study of 576 patients also reported 352 male (61.1%) and 224 female (38.9%) with a male-to-female ratio of 1.6:1, which is similar to the our study. Although variation in incidence may be due to poor health-care accessibility and system in our setup.

In our study, 39.83% of cases were due to bands and adhesions. Oladele et al. too found adhesive intestinal obstruction as the most common cause of symptoms in 44% of patients. The most common cause of adhesions was appendectomy (21.28%) followed by surgeries for DU perforation and LSCS (10.64% each), surgery for ileal perforation, ileostomy closure, previous adhesiolysis, and hemoperitoneum (6.38% each) similar to study done by Malik et al. Although the incidence of obstructed/
strangulated hernia has been reported more in the developing countries, in the present study, hernia was the third common etiology for obstruction. It could be because of the awareness of public and the availability of surgical facilities in the periphery for hernia repair and hernia being treated early. In our study, wound infection was found to be the most common post-operative complication similar to what was seen in the study done by Jain et al. 14

Overall mortality rate in the present series was 4.24% (5 cases), which is low as compared to other studies reported by Adhikari et al.11 7.35% and Khan et al.15 (15) 7%, which is slightly higher than our study.

CONCLUSION

From the study conducted in our hospital, we conclude that in our region, adhesions are the most common cause of bowel obstruction. It would be helpful if surgeons take preventive measures to reduce adhesion formation at laparotomy. Patients visiting the hospital should be encouraged to get radiological investigations done if they feel common symptoms of acute bowel obstruction so that elective surgery can be performed. Second, the patients should be advised to get pathological and microbiological investigations for tuberculosis done because tuberculosis is also emerging as a common cause of bowel obstruction. The late adhesive complications of bowel obstruction, mechanical female infertility, and chronic pain are often neglected during consent process. These should be included in consent and should be considered breach in duty of care not to inform patients.

REFERENCES


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Usefulness of Laryngoscopy and Computerized Tomography as Combined Diagnostic Modality for Accurate Diagnosis and Appropriate Treatment Selection in Laryngeal Malignancies

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Abstract

Introduction: Cancer can develop in any part of the larynx, but the cure rate is affected by the location of the tumor. For the purposes of tumor staging, the larynx is divided into three anatomical regions: The glottis (true vocal cords, anterior, and posterior commissures); the supraglottis (epiglottis, arytenoids and aryepiglottic folds, and false cords); and the subglottis.

Aim: The aim of the study is to study about the involvement of the pre-epiglottic and paraglottic spaces in tumors of larynx and to trace the extent of spread of tumour from one region to other regions.

Materials and Methods: 30 cases were selected in which there was good clinicopathological correlation and growth patterns could be compared with computerized tomography (CT) findings.

Results: 60% patients have pre-epiglottic space involvement seen in CT, which could not be found in laryngoscopic. True vocal cord involvements are picked up as same in both CT and laryngoscopic examination. Anterior commissure involvement is detected more in CT and is about 50%. Whereas in laryngoscopic examinations 23% were detectable.

Conclusion: All cases of laryngeal malignancies combined CT and laryngoscopic examination should be taken for accurate diagnosis and appropriate treatment selection.

Key words: Computerized tomography scan, Laryngeal cancer, Laryngoscopy

INTRODUCTION

Almost all malignancies of the larynx arise from the mucosal surface and thus are accessible to direct visualization and biopsy. The anatomy of larynx is relatively complex and landmarks are located close to one another. However, the computerized tomography (CT) evaluates areas that the clinician cannot see: Areas deep to the mucosa or blocked from direct visualization by the bulk of the tumour.¹⁻³

The goal of the CT study is to help determine the most appropriate therapy. A total laryngectomy leaves the patients without voice. Various partial laryngectomies leave enough of the larynx so voice can be produced by the normal mechanism. The feasibility of these voice conserving partial laryngectomies depends on the position of the tumor relative to the potential lines of resection. Therefore, accurate demonstration of the extent of the tumor is very important.⁴⁻⁵

Modem laryngeal imaging uses either CT or magnetic resonance imaging (MRI) to show the relationship of disease to very small laryngeal structures. Even in patients who cannot cooperate completely, CT offers a consistently good examination, with short imaging times, and thin sections.

Before the advent of CT and MRI techniques, accurate assessment of the deep tissues, and cartilages of the
larynx could be achieved only by surgical exploration. Direct laryngoscopy is useful to demonstrate the mucosal surface of the larynx and CT is more useful for diagnosing the tissue plane invasion and luminal extension of the growth. This study explains how combination of endoscopy and CT scan is a better diagnostic tool in therapeutic planning of malignant tumors of larynx.6-8

Aim
To study about the involvement of the pre-epiglottic and paraglottic spaces in tumors of larynx and to trace the extent of spread of tumor from one region to other regions.

MATERIALS AND METHODS
This is a prospective study and all the cases selected for this study were chosen from the patients who attended our upgraded Institute of Otorhinolaryngology Government General Hospital, Chennai. This study was done after institutional approval and written informed consent was obtained from all the patients included in the study. 30 cases were selected in which there was good clinicopathological correlation and growth patterns could be compared with CT findings.

Inclusion Criteria
Malignant turnouts involving the larynx alone taken for study.

Exclusion Criteria
Benign lesions of larynx, tuberculosis, True vocal cord lesions without anterior commissure involvement, recurrent growth. The clinical evaluation was done by indirect laryngoscopy, direct laryngoscopy, neck examination, biopsy from the tumor, radiologic methods to assess the extent of tumor spread, and staging.

RESULTS
In this study, 19 out of 30 patients came between - years of age (63.3%) only six patients came under <40 years of age (20%) and two patients came above 70 years of age (6.66%). Among the 19 cases, in four 1-60 years of age, 11 were supraglottic, and eight were glottic regions. 19 out of 30 patients came between 41 and 60 years of age (63.3%). Only six patients came under <40 years of age (20%) and two patients came above 70 years of age (6.66%). Among the 19 cases in 41-60 years of age, 11 were supraglottic and eight were glottic tumors. Among the six cases <40 years of age, four were supraglottic growth and two were glottic tumors. No subglottic tumor was found. Among the 30 patients studied 28 were male and two were female with a male:female ratio of 14:1. This implies a higher incidence in male in this country. Glottic tumors in female patients were not found in our study. The absence of glottic tumor in female group may be due to absence of predisposing factors such as alcohol, smoking, and pan chewing. Among the patients selected for study tuberculosis was ruled out by clinical methods such as indirect laryngoscopy, direct laryngoscopy, Mantoux, erythrocyte sedimentation rate, X-ray chest, for all the patients biopsy had been taken before CT to confirm the diagnosis (Table 1).

60% patients have pre-epiglottic space involvement seen in CT, which could not be found in laryngoscopic. True vocal cord involvements are picked up as same in both CT and laryngoscopic examination. Anterior commissure involvement is detected more in CT and is about 50%, whereas in laryngoscopic examinations 23% were detectable. In supraglottic region, there is no difference in tumor spread in both laryngoscopic examination (97%) and CT (97%). Subglottic involvement is detected more in CT scan (7%). Tracheal air column is better shown by CT than laryngoscopic examination that is identified and compromised in 7% CT whereas 3.3% in laryngoscopic examinations. Laryngeal frame work involvement is accurately estimated in CT scan which is about 44% in thyroid cartilage involvement. While in laryngoscopic examinations both were detected less in percentage is about 7%. No extralaryngeal spread is diagnosed by laryngoscopic examination. Whereas 50% of extra laryngeal spread diagnosed using CT scan (Table 2).

In clinical staging, 21 out of 30 (70%) patients presented in Stages III, 4 out of 30 (13.3%) in Stage IV. Whereas 5 out of 30 (16.6%) in Stage II and no patient presented in Stage I (Table 3).

<table>
<thead>
<tr>
<th>Site</th>
<th>n=30 (%)</th>
</tr>
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<tbody>
<tr>
<td>Within laryngeal frame work</td>
<td></td>
</tr>
<tr>
<td>Pre-epiglottic space</td>
<td>60</td>
</tr>
<tr>
<td>True vocal cords</td>
<td>83</td>
</tr>
<tr>
<td>Anterior commissure</td>
<td>50</td>
</tr>
<tr>
<td>Supraglottic/subglottic region</td>
<td>97/7</td>
</tr>
<tr>
<td>Tracheal air column</td>
<td>7</td>
</tr>
<tr>
<td>Laryngeal frame work</td>
<td></td>
</tr>
<tr>
<td>Thyroid cartilage</td>
<td>44</td>
</tr>
<tr>
<td>Beyond the laryngeal frame work</td>
<td></td>
</tr>
<tr>
<td>Extralaryngeal space</td>
<td>50</td>
</tr>
<tr>
<td>Lymph nodes</td>
<td>33</td>
</tr>
</tbody>
</table>

CT: Computerized tomography, CE: Contrast enhanced
In staging of supraglottic tumors underestimation occurred in laryngoscopic examination particularly in T2 and T3 whereas overestimation occurred in T3 stage when compared to CT staging (Table 4).

In glottic tumors underestimation in T2 and T3 stages in laryngoscopic staging compared to CT staging (Table 5).

Thyroid cartilage involvement was better assessed by CT than clinical examination. Hence, underestimation of T1 and overestimation of T3 occurred in clinical examination of supraglottic tumors. In glottic growths, underestimation of tumors occurred in T2 and T3 lesions.

Histopathological Examination
Among 30 patients, 29 had biopsy report as squamous cell carcinoma (96.66%) and one patient has verrucous carcinoma (3.33%) suggesting that all tumors are epithelial in origin (Table 6).

DISCUSSION
The laryngoscopic examination showed involvement of vocal cords, vestibular folds, ary epiglottic folds, arytenoids, pyriform fossae, and epiglottis very precisely whereas the involvement of pre-epiglottic space, paraglottic space, cricothyroid space, cricoarytenoid joint, thyroid cartilage, subglottic extension, and tracheal air column were not well shown. So that clinical staging of tumors was not complete and adequate and required additional investigation like CT. The mobility of vocal cords was best and most accurately estimated with laryngoscopic examination than CT scan. The CT was very useful in identification of involvement of pre-epiglottic space, paraglottic space, thyroid cartilage erosion, subglottic extension, involvement of anterior commissure, tracheal air column, thyroid gland, and lymph nodal metastasis. Pre-epiglottic space involvement is not at all detected by indirect laryngoscopy, direct laryngoscopy. It is only diagnosed by CT scan. Pre-epiglottic space is filled with fat and less vascular. Hence, it is resistant to radiotherapy. For this pre-epiglottic space involvement is contraindication for partial laryngectomy and radiotherapy. For this total or near total laryngectomy is indicated. In this study about 60% of cases were diagnosed CT scan. Invasion of pre-epiglottic space in supraglottic tumors 77.77% in our study which was very much higher. Indirect laryngoscopic examination almost correlates well with direct laryngoscopic examination. In our study, we found out additional findings in direct laryngoscopy over indirect laryngoscopy in three cases only out of 30 cases showing 10% variation. In one case, the cord mobility restricted was found to be a fixed cord. In another case, the left vocal cord not seen in indirect laryngoscopy was seen in direct laryngoscopy and found to be mobile. Flex extension of right cord was also seen in the same case. The CT scan is needed to the cartilage involvement, so overstate occurs if computerized tonograph scan is done. In our study about 50% of anterior commissure involvement, diagnosed in CT scan, whereas 23% only diagnosed in laryngoscopic examination. There is no difference in supraglottic tumors with CT and laryngoscopic examination. Laryngoscopic examination was almost same in finding out supraglottic tumor extension and adequacy of tracheal airway. Mobility of vocal cords was accurately estimated with laryngoscopic examination than CT. In supraglottic extension, the mass itself obstructed the view of vocal cords and fixity

<table>
<thead>
<tr>
<th>Table 2: Clinical staging</th>
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<tbody>
<tr>
<td>Site/stage</td>
</tr>
<tr>
<td>Supraglottis</td>
</tr>
<tr>
<td>Glottis</td>
</tr>
<tr>
<td>Subglottis</td>
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<thead>
<tr>
<th>Table 3: Correlation of laryngoscopic examination - CT staging in supraglottic tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>T stage</td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
</tr>
<tr>
<td>T4</td>
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<table>
<thead>
<tr>
<th>Table 4: Correlation of laryngoscopic examination - CT staging of glottic tumors</th>
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<tr>
<td>T stage</td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>T2</td>
</tr>
<tr>
<td>T3</td>
</tr>
<tr>
<td>T4</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 5: Laryngoscopic staging compared with CT staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
</tr>
<tr>
<td>Supraglottic</td>
</tr>
<tr>
<td>Glottis</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 6: Histopathological examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>1</td>
</tr>
</tbody>
</table>
end of vocal cords could not be assessed clinically. Hence, overestimation of T occurred. It is a hidden site. It may not be detected by laryngoscopic examination. CT scan is needed for evaluation of the subglottic region and tracheal air column. Subglottic involvement rules out any partial surgeries and it also needed to decide the extent of dissection of tumour while during radical surgeries.14

Thyroid cartilage and cricoid cartilage involvement is better detected by CT scan, whereas MRI is the ideal mode of investigation to detect the cartilage involvement. Thyroid cartilage invasion is a contraindication for any partial laryngectomies or radiotherapy here also CT scan plays a major role for planning the treatment.15

According to Will Roger’s phenomenon the development of better imaging means that systematic upstaging of tumors will occur when imaging data are added, so that tumors are upstaged and apparent improved correlation. Lymph nodes were better identified and staged in CT. The involvement of lymph nodes were identified in 10 patients (33%) by CT was compared to seven patients (23%) by laryngoscopic examination, i.e., three clinically nodal negative patients were found to nodal positive by CT. The discrete non-enhancing mass in the lymph node bearing region of neck >1.5 cm in one diameter is significant and considered as secondaries neck from primary tumor and this should not be missed.16

In all the 10 cases of lymph nodes involvement I.V. contrast material omnipaque (iohexol) was used. No complication due to I.V. contrast material was met. In non-enhancing CT, lymph nodes appeared as heterogenous mass lesion of more than 1.5 cm with ill-defined margins. Surrounding fat density appeared high - “dirty fat appearance.” There was evidence of cystic degeneration, necrosis, and no evidence of calcification.

CONCLUSION

Endoscopy and CT scan individually delineate the tumor extent incompletely. The combination of both increases better diagnosis of the three dimensional extent of the disease for selecting appropriate treatment modality and thereby reducing the residual disease as well as recurrence of disease and increasing the prognosis. In laryngeal malignancies when anterior commissure is involved CT is more useful in detecting thyroid cartilage and thyroid gland involvement. In case of glottic malignancies, CT is more useful and diagnosing the paraglottic and subglottic extension. In all these cases, CT is useful for diagnosing the occult cervical nodes. Considering the cost factor MRI can be restricted for high suspicious of cartilage involvement. Therefore, it is firmly suggested that all cases of laryngeal malignancies combined CT and laryngoscopic examination should be taken for accurate diagnosis and appropriate treatment selection.

REFERENCES

A Study on Ossicular Erosion in Chronic Suppurative Otitis Media

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Abstract

Introduction: Chronic suppurative otitis media (CSOM) is a common condition in otorhinolaryngology and it is characterized by chronic, intermittent or persistent discharge through a perforated tympanic membrane. Poor living conditions, overcrowding, poor hygiene, and nutrition have been suggested as the basis for the widespread prevalence of CSOM in developing countries.

Aim: To study the incidence of ossicular erosion with respect to each type of perforation of tympanic membrane.

Materials and Methods: Patients aged more than 16 years, diagnosed with CSOM and posted for middle ear surgery were included. Patients who were <16, had malignancy of middle ear, otitis externa, or previous history of ear surgery were excluded.

Results: In this study of 164 patients, the predominant type of CSOM was mucosal type. Among the pre-operative otoscopic examination results, the most common type of tympanic membrane perforation was subtotal perforation (43.2%), followed by perforation being small all quadrant central perforation (20.1%). Most common ossicle to erode in CSOM cases is a long process of incus (24.4%).

Conclusion: Ossicular erosion was found to be much more common in unsafe CSOM than in safe CSOM. Malleus was found to be the most resistant ossicle to erosion whereas incus was found to be the most susceptible.

Key words: Cholesteatoma, Chronic suppurative otitis media, Ossicles

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a prevalent middle ear pathology that constitutes of tympanic membrane perforation together with a chronically inflamed middle ear mucosa. CSOM can occur with or without cholesteatoma which is an in-growth of eardrum skin into the middle ear cavity.¹ CSOM is the leading cause of conductive hearing impairment in adults which is secondary to damage of the ear drum and middle ear ossicles induced by chronic inflammation present in the tympanic cavity. Ossicular erosion, a frequent complication of CSOM, may lead to total failure of middle ear mechanics and resulting in substantial hearing loss.² Both types of CSOM, tubotympanic which are considered safe, as well as atticotympanic which is considered unsafe, may lead to erosion of the ossicular chain.² This propensity for ossicular destruction is much greater in cases of unsafe CSOM, due to the presence of cholesteatoma and/or granulations.³ The proposed mechanism for erosion is chronic middle ear inflammation as a result of overproduction of cytokines—tumor necrosis factor (TNF) alpha, interleukin-2, fibroblast growth factor, and platelet-derived growth factor, which promote hypervascularization, osteoclast activation, and bone resorption causing ossicular damage. TNF-alpha also produces neovascularization and hence granulation tissue formation. CSOM is, thus, an inflammatory process with a defective wound healing mechanism.³ This inflammatory process in the middle ear is more harmful the longer it stays and the nearer it is to the ossicular chain.

Aim

The aim of the study was to study the incidence of ossicular erosion with respect to each type of perforation of tympanic membrane.

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MATERIALS AND METHODS

This was a prospective study, conducted in the Department of Otorhinolaryngology, Tirunelveli Medical College Hospital, Tirunelveli. Patients aged more than 16 years, diagnosed with CSOM and posted for middle ear surgery were included. According to the pro forma, detailed history was taken then through ENT, and systemic examination was done. The ears were examined by otoscopy initially and otoscopy to establish a preparative diagnosis of safe or unsafe disease. All patients underwent a pure tone audiometry, to find out the hearing status and obtain documentary evidence for the same, and X-ray mastoid (bilateral Schueller’s view) to assess the pathology and surgical anatomy of the mastoid. Exclusion criteria: History of previous mastoidectomy, previous stapedotomy or stapedectomy, malignancy of middle ear, and CSOM in congenitally defective ears.

RESULTS

A total of 164 patients with CSOM were recruited for this study. Of 164 patients, 40.9% were males and 59.1% were females Table 1. 33 patients had both ears included which were operated sequentially Table 2. Tubotympanic disease: This is also known as safe disease because it is bereft of any serious complications. The infection is limited to the mucosa and the antero inferior part of the middle ear cleft (Table 3). Out of 164 cases that were prepared for mastoidectomy, 90.85% cases were CSOM mucosal type, and 6.09% were CSOM squamous type. Maximum number of tympanic membrane perforations that presented to us were subtotal perforations. Small quadrant perforations were the next most common presentation Table 4. In 24.4% cases, long process of incus was eroded, proving to be the most common ossicular erosion in CSOM cases. Only 7.9% cases had stapes erosion in our study Table 5. Thus, stapes is also one among the resistant ossicles in the pathology of CSOM. In atticotympanic type of CSOM, long process of incus is the most common erosion found in our study. Percentage of erosion of each ossicle is higher in atticotympanic than in tubotympanic Table 6. In CSOM mucosal type, ossicles were mostly intact, compared to squamous type. Among the eroded ossicles, long process of incus is most commonly eroded. Maximum cases were managed by cortical mastoidectomy with Type 1 tympanoplasty. In few cases, when the remaining ossicles were unhealthy for ossicular reconstruction, we tried harvesting a bone graft from posterior canal wall, and drilling and grafting were done in such bone grafts, and ossiculoplasty was done. Such cases are also included in our study. 15 cases were managed by transposition of incus between malleus and suprastructure of stapes. Conchal cartilage was grafted in few cases in ossiculoplasty and in all these cases, the cartilage graft was placed medial to temporalis fascia graft to prevent retraction of the graft Table 7.

DISCUSSION

Thomsen et al. reported that bone erosion in chronic otitis media was more prevalent when cholesteatoma was present, but it still occurred in the absence of cholesteatoma.
Table 6: Classification of ossicular erosion based on tubotympanic and atticoantral type of CSOM

<table>
<thead>
<tr>
<th>Ossicles</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tubotympanic</td>
</tr>
<tr>
<td>Malleus</td>
<td></td>
</tr>
<tr>
<td>Handle</td>
<td>8 (5)</td>
</tr>
<tr>
<td>Head and handle</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Intact</td>
<td>141 (95)</td>
</tr>
<tr>
<td>Incus</td>
<td></td>
</tr>
<tr>
<td>Long process</td>
<td>31 (21)</td>
</tr>
<tr>
<td>Completely eroded</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Intact</td>
<td>118 (79)</td>
</tr>
<tr>
<td>Stapes</td>
<td></td>
</tr>
<tr>
<td>Suprastructure</td>
<td>6 (4)</td>
</tr>
<tr>
<td>Intact</td>
<td>143 (96)</td>
</tr>
</tbody>
</table>

CSOM: Chronic suppurative otitis media

Table 7: Classification of surgeries done

<table>
<thead>
<tr>
<th>Surgeries performed</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM, bone graft from post canal wall, over footplate</td>
<td>1 (1)</td>
</tr>
<tr>
<td>articulate with M</td>
<td></td>
</tr>
<tr>
<td>CM, bone graft from post canal wall, over footplate arti</td>
<td>2 (1)</td>
</tr>
<tr>
<td>with neovascularization TM</td>
<td></td>
</tr>
<tr>
<td>CM, I reshaped and kept bet M and SS</td>
<td>15 (9)</td>
</tr>
<tr>
<td>CM, I reshaped between SS and neovascularization TM</td>
<td>1 (1)</td>
</tr>
<tr>
<td>CM, M reshaped between footplate and neovascularization TM, conchal Cover M</td>
<td>3 (2)</td>
</tr>
<tr>
<td>CM, M reshaped between SS and neovascularization TM</td>
<td>2 (1)</td>
</tr>
<tr>
<td>CM, M reshaped between SS and neovascularization TM, conchal cartilage over M</td>
<td>1 (1)</td>
</tr>
<tr>
<td>CM, Type 1 tympanic</td>
<td>114 (68)</td>
</tr>
<tr>
<td>CM, Type 1 tympanic, conchal cartilage under the handle</td>
<td>2 (1)</td>
</tr>
<tr>
<td>CM, Type 2 tympanic</td>
<td>1 (1)</td>
</tr>
<tr>
<td>CM, Type 3 tympanic</td>
<td>5 (3)</td>
</tr>
<tr>
<td>CM, Type 3 tympanic, conchal cartilage cover SS</td>
<td>2 (1)</td>
</tr>
<tr>
<td>CM, M reshaped and placed over SS</td>
<td>3 (2)</td>
</tr>
<tr>
<td>MRM, bone graft from post canal wall, over footplate</td>
<td>2 (1)</td>
</tr>
<tr>
<td>MRM, M reshaped between footplate and neovascularization TM</td>
<td>1 (1)</td>
</tr>
<tr>
<td>MRM, Type 1 tympanic, conchal cartilage under the handle</td>
<td>1 (1)</td>
</tr>
<tr>
<td>MRM, Type 3 tympanic</td>
<td>3 (2)</td>
</tr>
<tr>
<td>MRM, Type 4 tympanic</td>
<td>4 (2)</td>
</tr>
<tr>
<td>MRM, M reshaped and kept over footplate</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

MRM: Modified radical mastoidectomy, CM: Cortical mastoidectomy, TM: Tympanic membrane, SS: Stapes superstructure, PSR: Posterosuperior retraction, RET: Retraction

Mathur et al., in 1991, observed erosion of incus in 22% of cases and Quaranta et al., in 1995, reported same in 27% cases.

Udaipurwala et al. have probably considered the lenticular process to be a part of the long process of incus, since they have not mentioned it separately. Austin reported the most common ossicular defect to be the erosion of incus, with intact malleus and stapes, in 29.50% cases. Kartush found erosion of long process of incus with an intact malleus handle and stapes superstructure (Type A) as the most common ossicular defect. Shrestha et al. and Mathur et al. also reported similar findings in unsafe CSOM.

It is hypothesized that middle ear ossicles damage in CSOM is induced by an active phenomena of osteoclastic osseous resorption rather than by a passive avascular necrosis. The suggested mechanism for bone erosion is excessive formation of inflammatory mediators in the tympanic cavity which induces osteoclast activation and bone resorption resulting in ossicular destruction. The duration of the inflammatory process and its vicinity to the ossicular chain are factors which appear to be the most harmful for the ossicles. The factors that may explain that ossicular chain status in the otological pathology of the ENT Clinic Timisoara. The incidence of ossicular erosion was found to be much greater in unsafe CSOM than in safe CSOM.

CONCLUSION

In this study, we found the malleus to be the most resistant ossicle to erosion in CSOM whereas incus was found to be the most susceptible. The incidence of ossicular erosion was found to be much greater in unsafe CSOM than in safe CSOM.

REFERENCES


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Hyponatremia Due to Pulmonary Tuberculosis in Indian Population

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Abstract

Introduction: The magnitude of hyponatremia in hospitalized patients has been estimated to be about 15% in many studies. Hyponatremia in many studies has been correlated with increased mortality. Besides other infectious agents causing pneumonia pulmonary tuberculosis (PTB) has been strongly associated with syndrome of inappropriate antidiuretic hormone secretion (SIADH).

Aims: The objective of the study was the evaluation of Indian patients of PTB with hyponatremia.

Materials and Methods: In this study patient with a diagnosis of secondary PTB admitted to Shri Maharaja Hari Singh Hospital, Jammu and Kashmir, India, from July 2015 to July 2016 were evaluated for various electrolyte abnormalities. The diagnosis of PTB was based on the appearance of acid fast bacilli in sputum smears or sputum cultures, carried by the laboratories authorized by the norms set in accordance to Revised National Tuberculosis (TB) Control Program, without any evidence of miliary TB.

Results: Our study enrolled a total of 58 patients with mean age of 51.57 ± 16.3, hyponatremia was present in 51.8% (29) of the patients. Mean age of patients with hyponatremia was 58.24 ± 15.1 and mean age of patients with normal sodium was 44.41 ± 14.6. This was a statistically significant relationship (P < 0.001). The patients with hyponatremia were further evaluated for serum osmolality, urine osmolality, urine sodium levels and thyroid-stimulating hormone levels, and 62% of patients with hyponatremia were found to have SIADH according to Schwartz criteria.

Conclusion: This study suggested that there was a high incidence of hyponatremia in PTB and age was one of the important predisposing factors for the development of hyponatremia in patients with PTB, SIADH could be one of the major mechanisms through which PTB causes hyponatremia.

Key words: Hyponatremia, Pulmonary tuberculosis, Syndrome of inappropriate anti diuretic hormone secretion

BACKGROUND

The frequency of hyponatremia in hospitalized patients and its association with increased mortality has been validated in many studies in the past. The magnitude of hyponatremia in hospitalized patients has been estimated to be about 15% in many studies.¹,² Not only does this electrolyte abnormality produce clinical manifestations varying from asymptomatic state to overt signs such as clinical seizures and coma, but hyponatremia in many studies has been correlated with increased mortality. In euvoelmic patients presenting with hyponatremia, strong consideration should be given to syndrome of inappropriate anti diuretic hormone secretion (SIADH), besides other causes. SIADH was initially described by Leaf and Mamby. SIADH consists of hyponatremia, inappropriately elevated urine osmolality, excessive urine sodium and decreased serum osmolality in a euvoelmic patient without edema. These findings should occur in the absence of diuretic treatment with normal cardiac, renal, adrenal, hepatic, and thyroid function. Besides other infectious agents causing pneumonia pulmonary TB (PTB) has been strongly associated with SIADH.³,⁴
PTB is one of the rare pulmonary infections which can induce hyponatremia. Tuberculosis (TB) is considered as one of the common illnesses in developing countries such as India which can present with various clinical manifestations. India is the country with the highest burden of TB. The World Health Organization (WHO) TB statistics for India for 2015 give an estimated incidence figure of 2.2 million cases of TB for India out of a global incidence of 9.6 million. The TB incidence for India is the number of new cases of active TB disease in India during a certain time period (usually a year).

The estimated TB prevalence figure for 2015 is given as 2.5 million. It is estimated that about 40% of the Indian population is infected with TB bacteria, the vast majority of whom have latent TB rather than TB disease. TB can induce hyponatremia through several mechanisms containing local invasion to the adrenal glands (adrenal insufficiency), local invasion to hypothalamus or pituitary gland, tubercular meningitis, and inappropriate antidiuretic hormone (ADH) secretion through pulmonary infection.

**Objective**

The aim of the study was to evaluate the incidence of hyponatremia in Indian patients with PTB attributable to SIADH.

**MATERIALS AND METHODS**

**Design and Participants**

We have prospectively evaluated patients with a diagnosis of secondary PTB and that were admitted in general medicine wards of Shri Maharaja Hari Singh (SMHS) Hospital, Jammu and Kashmir, India, from July 2015 to July 2016. Demographic and laboratory characteristics were recorded. The confirmation of secondary PTB was based on the appearance of acid fast bacilli on two sputum smears or *Mycobacterium* TB on a sputum culture, in the absence of radiological features of miliary TB. The microbiological tests were done in the hospital lab of SMHS which is authorized according to the norms set by Revised National TB Control Program. The patients with abnormal mental status, any evidence of tubercular meningitis, edema forming conditions, uncontrolled hyperglycemia, renal insufficiency or failure, hyperlipidemia, receiving diuretics or any medications related to SIADH or induced vasopressin release were excluded.

**Assessment and Treatment**

All the diseases that cause renal loss of sodium were excluded, diseases causing abnormalities of serum sodium and serum and urine osmolalities were also excluded. Patients were on a normal diet. The patient received antitubercular drugs according to the WHO guidelines, rifampicin, isoniazid, ethambutol, and pyrazinamide during first 2 months and rifampicin and isoniazid for next 4-10 months. Blood samples and urine samples were collected simultaneously for sodium levels and osmolality measurements.

**Statistics**

Data were collected to compare the profile and laboratory characteristics of PTB patients with or without hyponatremia. The data were analyzed using SPSS software (17th edition) and $P < 0.05$ was considered significant. Quantitative and qualitative data were reported using mean ± standard deviation and infrequency (percentage). After checking normal distribution of quantitative data, the parametric or nonparametric tests were used. For the analysis of qualitative data with normal distribution, Student’s $t$-test, ANOVA, and Pearson correlation and for the abnormal distributed variables, Mann–Whitney U, Kruskal–Wallis, and Spearman correlation tests were used.

**RESULTS**

A total of 58 patients were enrolled for the study. The mean age of all the patients was 51.57 ± 16.3. The males were 65.6% (40), mean age of males 51.38 ± 14.9, and mean age of females was 52.06 ± 20.06 which was statistically insignificant.

Hyponatremia was present in 51.8% (29) of the patients, mean age of hyponatremics was 58.24 ± 15.1 and mean age of eunatremics was 44.41 ± 14.6. This was a statistically significant relationship ($P < 0.001$).

Mean serum sodium was 135.73 ± 6.4. Mean serum Na in males was 136.03 ± 6.5 versus mean serum sodium in females was 135.00 ± 6.5. 50% (20) males versus 56.2% (9) females had hyponatremia there was no significant relationship between gender and hyponatremia.

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Hyponatremia and SIADH were found fairly correlated with Spearman’s correlation coefficient of 0.7 which was found statistically significant ($P < 0.001$).

The patients with hyponatremia were further evaluated for serum osmolality, urine osmolality, urine sodium levels and thyroid-stimulating hormone (TSH) levels, and 62% of patients with hyponatremia were found to have SIADH according to Schwartz criteria.

Four patients with hyponatremia had TSH levels more than 5 nIU/ml.
DISCUSSION

Not only has been frequency of hyponatremia established in many studies in the past but also the association of hyponatremia with increased mortality and morbidity has been validated. Longer in hospital stay, osteoporosis, and increased incidence of falls and fractures has been associated with this metabolic abnormality.

Previous studies have shown that hyponatremia frequently develops in hospitalized patients.20 Various studies have shown an association of general hyponatremia with increased morbidity and mortality,21-23 longer hospitalization,24 osteoporosis,25 and falls and fractures,26 and cognitive impairment.27 The most common causes of severe hyponatremia in hospital setting in adults are therapy with thiazides, the post-operative state and other causes of the syndrome of inappropriate secretion of ADH, polydipsia in psychiatric patients, and transurethral prostatectomy.27-31

In developing nations, infectious diseases are common causes for hospital admission and PTB being one of them. Previous studies have shown that hyponatremia developed in a significant number of PTB patients. A study conducted by Jafari et al., in year 2012,32 in Iran concluded that around 51% of PTB patients admitted to hospital developed hyponatremia, this is in accordance with the results of our study where hyponatremia developed in 51.8% of the patients of PTB. Age is an important predisposing factor to the development of hyponatremia in hospitalized patients. The studies have shown that elderly are more prone to the development of hyponatremia, Hoyle et al. conducted a study in 2006 where he concluded that hyponatremia developed in almost half of the hospitalized patients who were >65 years of age.17,25,33-35 Our study demonstrated that the mean age of hyponatremics was 58.24 years. The older age of patients with hyponatremia stresses on the fact that the patients with advanced age need to be strictly screened for hyponatremia such that future complications of this metabolic abnormality can be averted. SIADH is a common cause of hyponatremia.

SIADH is a considerable complication of pulmonary infection, inflammatory and neoplasic disorders. SIADH has been shown to occur in infectious situations such as TB, although very few studies have actually delineated the prevalence and incidence. There have been numerous studies that showed the occurrence of SIADH in both pulmonary as well as meningeal TB. Vorherr et al. have reported a case with PTB and hyponatremia and found antidiuretic secreting lesions in tuberculosis lung tissues.17 Bryant have suggested the syndrome of inappropriate secretion of ADH for patients with an infectious pulmonary disease such as PTB.3

Cockcroft et al. reported a 74-year-old woman with miliary TB which was complicated by severe hyponatremia due to SIADH.4

There are many mechanisms of SIADH in TB. These are studies which have shown that more than 60% of patients with tubercular meningitis may present with SIADH.36 SIADH must be suspected in every case with hyponatremia with low serum osmolality condition, a normal acid-base state, urine osmolality over 100 mOsm/kg, and urine sodium concentration more than 40 mEq/L. In our study, 62% of the patients with hyponatremia were qualifying for the criteria of SIADH (Schwartz criteria).39 Although this number could not reach to a statistical significance due to the small number of participants in the study, it points toward the importance of screening of patients for SIADH in development of hyponatremia. Therefore, further large scale studies need to be conducted to establish a firmer relation between hyponatremia in PTB and SIADH.

CONCLUSION

This study suggested that there was a high incidence of hyponatremia in PTB and age was one of the important predisposing factors for the development of hyponatremia in patients with PTB, SIADH could be one of the major mechanisms through which PTB causes hyponatremia.

REFERENCES

Epidemiological Factors in Breast Cancer and to Evaluate the Diagnostic Accuracy of Fine-needle Aspiration Cytology and Imprint Cytology in Palpable Breast Lump

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It is the most common malignant disease of women in the United Kingdom and causes 10,000 deaths annually. In India, breast cancer is the second most common cancer after cancer of the uterine cervix in females. Hence, an understanding of its epidemiology with greater subsequent emphasis on prevention and early diagnosis in high-risk population is necessary.

Epidemiology can be defined as “that field of science which deals with the relationship of various factors which determine the occurrence, frequency, and distribution of a disease or physiological state in a community or a group of people.” Epidemiological studies are being increasingly undertaken in the field of cancer. One of the primary goals of cancer epidemiology is to delineate disease distribution in population. This knowledge may then lead to the identification of high-risk groups.

Abstract

Introduction: Breast cancer is of extreme public health importance, as it represents one of the leading causes of cancer morbidity and mortality in women. It accounts for 27% of all malignant neoplasms in American women and represents the leading cause of all deaths in women aged 40-44 years. It is the most common malignant disease of women in the United Kingdom and causes 10,000 deaths annually. In India, breast cancer is the second most common cancer after cancer of the uterine cervix in females.

Material and Methods: The present study included all patients of breast lump, who attended Outpatient Department and Indoor of SVBP Hospital, Meerut, from 1st September 1985 to 31st August 1986. A detailed history of patients regarding the various risk factors of breast cancer was taken and recorded on a pre-defined and pretested pro forma. The present study comprises of 125 cases of breast lump, who attended the Outpatients Department and Indoor of S.V.B.P. Hospital, Meerut, from 1st September 1985 to 31 August 1986. A written consent was taken from every patient.

Results: Of the total of breast cancer patients, 64.2% belonged to the urban out and 35.7% were rural. 57.2% of patients were from high socioeconomic status. 35% were from upper to middle class and only 7.1% patients were from low social group. In majority of the cases, the disease was detected by themselves (87.5%). 67% of patients had delay in seeking local doctor. An avoidable delay was also caused by attending medical practitioners in sending the patients to the hospital in 28% of cases.

Conclusion: Among all cancer cases, 52% of patients were obese. 64% of cases had given the history of taking high-fat diet. 58% of females with breast cancer had high breast fat. All breast cancer patients were married and had children.

Key words: Aspiration, Breast, Cancer, Lump

INTRODUCTION

Breast cancer is of extreme public health importance, as it represents one of the leading causes of cancer morbidity and mortality in women. It accounts for 27% of all malignant neoplasms in American women and represents the leading cause of all deaths in women aged 40-44 years.¹,²

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Month of Publishing : 08-2017
Early and correct diagnosis is of immense importance in deciding the line of management and its subsequent success in various breast tissue lesions. Innumerable attempts have been made since long, to find out a correct, safe, and simple method, by which a pre-operative, precise, and conclusive diagnosis can be made. Fine-needle aspiration biopsy was first introduced by Martin and Ellis in 1930 for revealing the pathological nature of tumors. Due to less cohesive nature of tumor cells, it is possible to aspirate ample amount of cells to be spread on slides for cytological examination. Fine-needle aspiration is safe, simple, and rapid method.

Besides needle aspiration, tumor imprints have been used for many years by cellular pathologist in their study of biopsied material obtained. Before fixation in formalin, Dudgeon and Patrick (1927) were the first to use imprint cytology for the diagnosis of breast lump. Subsequently, many workers have used this method. It is a simple, rapid, and economical method. It is of much help at places where facilities of frozen sections are not available.5-10

**Aims**

1. To study the epidemiological variables related to the breast cancer in the present study.
2. To evaluate the accuracy of the needle aspiration cytology in the diagnosis of the palpable breast lump.
3. To evaluate the diagnostic accuracy of the imprint cytology in palpable breast lump.

**MATERIALS AND METHODS**

The present study included all patients of breast lump, who attended Outpatient Department and Indoor of SVBP Hospital, Meerut, from 1st September 1985 to 31st August 1986. A detailed history of patients regarding the various risk factors of breast cancer was taken and recorded on a pre-defined and pretested pro forma. The present study comprises of 125 cases of breast lump, who attended the Outpatients Department and Indoor of S.V.B.P. Hospital, Meerut, from 1st September 1985 to 31 August 1986. These patients were thoroughly interrogated for detailed history and various epidemiological factors related to the breast cancer were studied. Relevant hematological, biochemical, and radiological investigations were carried out. Fine-needle aspiration was performed in 116 cases of breast lump pre-operatively, and cytological diagnosis was made. These patients were subjected to either definitive operative procedure or excisional biopsy and specimens so moved were used for imprint cytology and paraffin sections. In 111 cases, imprints were made. The results of needle aspiration cytology and imprint cytology were compared with histopathological studies of their paraffin sections.

**Inclusion Criteria**

All female patients with breast lump were included in the study.

**Exclusion Criteria**

Patients with significant comorbidities, cardiovascular, and renal complications were excluded from the study.

**RESULTS**

Maximum patients (71.4%) with breast cancer were Hindus and 28.6% of patients were Muslims and Sikhs. In control group, 85.7% of patients were Hindus and 10.3% were Muslims and Sikhs. This difference in the incidence of cancer breast in relation to religion was not significant ($P = 0.05$). Out of the total male patients and 92.9 (Table 1).

Maximum patients (71.4%) with breast cancer were Hindus and 28.6% patients were Muslims and Sikhs. In control group, 85.7% of patients were Hindus and 14.3% were Muslims and Sikhs. This difference in the incidence of cancer breast in relation.

The mean age in cancer breast patients was 41.5 years, whereas in benign group, it was found to be 30 years. Of the total 56 breast cancer patients, 7.1% were male patients and 92.9% were females, whereas in control group, only one patient (1.4%) was male and rest of the patients were females as shown in Table 2. The sex has no relation with the incidence of breast cancer ($P = 0.05$).

Thirty-six (64.3%) breast cancer patients belonged to urban areas and 20 (35.7%) patients belong to rural areas, whereas the incidence of breast cancer in different socioeconomic classes was found to be statistically significant ($P = 0.001$) as depicted. Majority of the breast cancer patients (87.5%) discovered their breast lump by themselves on self-palpation and only in 12.5% cases, the lesion was discovered by other people.

Only two cases (3.5%) out of 56 breast cancer patients consulted the surgeon within 15 days of the onset of the symptoms and rest of the 54 patients (96.5%) reported to the doctor after 15 days. In majority of the cases (67.0%), the reason for delay was ignorance. 44.6% of breast cancer patients were illiterate and only 7.14% were graduates and postgraduates. In control group, 42.85%
patients were illiterate and 2.85% patients were graduates and postgraduates. The incidence of breast cancer has no relation with the education of the patient \((P = 0.05)\).

Nearly 64% of the breast cancer patients had consumed high amount of fat in their diet, whereas in control group, only 29% patients had taken high amount of fats in their diet. The incidence of breast cancer in relation with dietary fat consumption was highly significant \((P < 0.001)\).

It was interesting to note that the body weights of a patient have a direct relation with the incidence of carcinoma breast. 52% of the cancer breast patients were obese and having body weight > 60 kg, whereas in control group, 70% of patients were of average built and having their body weight between 45-60 kg. The difference in the incidence of breast cancer in relation to body weights was found to be statistically significant \((P = 0.001)\). 57.69% of cancer breast patient were having high breast fat, and only 5.8% patients were having low breast fat, whereas in control group, 58% of females were having average breast fat. It was found that half of the breast cancer patients had their menarche at an early age between 12 and 13 years, whereas in control group, maximum number of patients (81.2%) had menarche between 14-15 years of age. The difference in the incidence of breast cancer in relation to the age of menarche was found to be highly significant \((P < 0.001)\).

Nearly 46% of breast cancer patients were post-menopausal, whereas in control group, only one patient was post-menopausal. The difference in the incidence of breast cancer in relation to the menstrual status was found to be highly significant \((P < 0.001)\). Out of 24 post-menopausal women, 30% of patients were of average built and 70% of women were obese while in pre-menopausal group, only 20% females were obese.

Half of the breast cancer patients had either 3 or more than three male children, whereas in control group, it was only 11.2%. This difference was found to be statistically significant \((P < 0.001)\). Maximum number (80.7%) breast cancer patients had their first child after 21 years of age, whereas in control group, majority of the patients (63.5%) had their first child before the age of 20 years. This finding was found to be highly significant \((P = 0.001)\).

No breastfeeding was carried out in 27% of breast cancer patients. 12% of breast cancer patients had breast-fed for more than a year, whereas in control group, it was 32%. The incidence of breast cancer in relation to the breastfeeding was significant \((P < 0.005)\). Only 7% of breast cancer patients had the family history of breast cancer positive and in 93% cases, it was negative, whereas in control group, no patient was having family history positive for carcinoma breast.

### DISCUSSION

The present study use conducted on 126 cases of breast lump who attended the Outpatient Department and Indoor of SVBP Hospital, Meerut, from 1st September 1985 to 1st August 1990. Out of 126 patients, 70 (55%) were benign breast disorder and 56 (45%) were of carcinoma breast. The highest incidence of breast cancer was seen in 41-50 years of age (35.71%) with average age of 47.5% years. Nagpal and Singh (1983) also recorded the highest incidence of breast cancer in 41-50 years of age. Vaidya et al., Pr and Sengupta (1983), and Sharma and Singh (1983) noted that the maximum number or patients in their series were between 40 and 50 years of age.\(^{11,13}\)

Out of 56 patients of breast cancer, 7.1% were males and 92.9% were females. Raddy et al. (1956) and Nagpal and Singh (1983) have reported 7.5% and 4.2% incidence of breast cancer among males, respectively. Sirsat (1957), Ian et al. (1962), Dubey and Agarwal (1971), Dutta et al., and Deodher et al. (1978) have also noted a higher incidence of breast cancer in males as compared to the incidence of breast cancer in males in Western countries. The

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**Table 1: Distribution of social adaptive behavior among the study population**

<table>
<thead>
<tr>
<th>Social adaptive behavior</th>
<th>Types of disease</th>
<th>Fisher’s exact test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salt-wasting (%)</td>
<td>Simple-virilizing (%)</td>
</tr>
<tr>
<td>Adequate</td>
<td>16 (47)</td>
<td>13 (62)</td>
</tr>
<tr>
<td>Moderately low</td>
<td>15 (44)</td>
<td>7 (33)</td>
</tr>
<tr>
<td>Low</td>
<td>3 (9)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>34 (100)</td>
<td>21 (100)</td>
</tr>
</tbody>
</table>

**Table 2: Distribution of IQ among the two types of CAH in the study population**

<table>
<thead>
<tr>
<th>IQ range</th>
<th>Types of disease</th>
<th>Fisher’s exact test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salt-wasting (%)</td>
<td>Simple-virilizing (%)</td>
</tr>
<tr>
<td>50-70</td>
<td>1 (3)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>70-90</td>
<td>20 (59)</td>
<td>9 (43)</td>
</tr>
<tr>
<td>90-110</td>
<td>13 (38)</td>
<td>11 (52)</td>
</tr>
<tr>
<td>Total</td>
<td>34 (100)</td>
<td>21 (100)</td>
</tr>
</tbody>
</table>
The incidence of breast cancer was relatively higher in urban areas compared to rural areas (35.7%). This difference may be due to the fact that relatively better health services are available and people are more cancer conscious. In urban areas, Staszewski and Bertini et al. (1971) have also reported a lower incidence of breast cancer in rural areas. Majority of the patients were from high socioeconomic group (57.2%) and only 7.1% patients were belonging to low social class. Shapiro (1968), MacMahon et al., Shimkin, Sherman and Korenman, and Wilson have also observed a higher incidence of breast cancer in higher socioeconomic group.

In the present study, 87.5% of cancer breast patients noticed their disease by themselves on self-palpation and the importance of self-palpation have been emphasized by others also (Kelly et al., 1979; Rao et al., 1983). 67% are ignorant about their disease and did not seek early medical advice likely due to the fact that 44.64% of patients were illiterates and were not aware of the gravity of the disease. In 28% of patients, the delay in seeking the medical advice remained contributory to unawareness of attending medical practitioners. The importance of self-palpation and health education for breast cancer would provoke the awareness for seeking early medical advice.

64% of patients with breast cancer had given the history of baking high amount of fat in their diets which is attribute to their high socioeconomic status Carrol and Hopkins.

Buell (1973) and MacMohan et al. have also found the association between high-fat diet and high breast cancer risk, considerable number (46%) of breast cancer patients were post-menopausal, out of which 70% were obese. Thus, obesity might be acting through hormonal influences. Dewaard (1960) have also noted an association between obesity and post-menopausal breast cancer. He found that estrogenic cervical smears persisted in post-menopausal overweight women. Barlow et al. (1969), Hein (1970), Drasan (1973), Armstrong et al. (1973), and Hankin (1978) have also suggested that gain in weight may enhance certain imbalance in steroid pattern which may act as cancer promoter.

Thirty three breast cancer patients had increased breast fat. Similar data was shown by other studies in the past.

All the patients with breast cancer in this series were married. Shanna and Singn (1983) also found that all their cancer. Shanna and Singn (1983) also found that all the cancer patients were married. However, Lane Claypton Barnett(1948) found 22% of patients in these series were unmarried. Wynder (1960) observed that 15% British, 10% Japanese, and 7% Indian breast cancer patients were married. Nair et al. (1983) noted that 1.6% of patients in their series were unmarried.

Among breast cancer patients, 76.9% of cases had either 3 or more children. However, Lane-Claypon, Lilienfeld (1955), MacMahon et al., and Jussawalla et al. have noticed higher incidence of breast cancer among nulliparous women. This difference in the incidence of breast cancer in relation to this factor may be because the sample is very small. 61.5% of breast cancer patients had their first child after 24 years of age which is statistically significant (P < 0.001). MacMahon et al. have also noted a higher incidence of breast cancer in women whose 1st pregnancy has occurred after the age of 25 years. In 63% of the breast cancer patients, the first child was male. The total number of male children of breast cancer patients was more, and total number of female children of breast cancer patients was less as compared to control. These findings were statistically significant (P < 0.001).

It was surprising to find that 27% of breast cancer patients had not breast-fed their children and only 12% of breast cancer patients had breast-fed for more than a year. This difference in the incidence of breast cancer was found to be statistically significant (P = 0.005). Lane-Claypon, Schaefer (1969), Miller et al. (1976), Anderson (1975), Lubin et al. (1982), Byers et al. (1985), McTiernan and Thomas also noted a higher incidence of breast cancer among those women who have not breast-fed their children or have breast-fed only for short periods. 70% of patients had their menopause after 45 years of age and had a menstrual life of more than 30 years. Trichopolous (1972) also noted the similar observations. Vaidya et al. reported that 91.5% of cancer breast patients in their series had menopause after 45 years of age. Only 2% of patients with cancer breast had given the history of taking contraceptive pills for 1 year. The number of patients in present study is too less to comment on this. It was found that about 35% of cancer breast patients were having more than three X-rays exposures in the past, which was statistically significant (P = 40.001). Simon Nolo (1975) have also observed that women who exposed to high dose of ionizing radiation had higher incidence of cancer breast carcinoma.

In 116 patient of breast pump, needle aspiration smears have shown a correct diagnosis of benign in 97% of cases and correct diagnosis of malignant in 95.8% of cases. Overall, a diagnostic accuracy of 96.5% was obtained. Aspiration smears revealed that malignant cells were
larger than benign cells having characteristic features of malignancy including altered nucleocytoplasmic ratio, fine and irregular chromatin reticulum, hyperchromasia, and pleomorphism either observed single or in sheets depending on cellular and fibrous component of the tumor, as later on confirmed by histopathology.26-29 Other workers have also reported similar results.

CONCLUSION

Of the total breast cancer patients 64.2%. Belonged to urban area and 35.7% were from urban area. 57.2% patients were of high socioeconomic status, 35.7% from upper to middle class and only 7.1% patients were from low socioeconomic status. In majority of the cases the disease detected by themselves (87.5%). 15. 67% of patients had delay in seeking local doctor and an avoidable delay was caused by attending medical practitioners in sending the patients to hospital in about 28% of cases. Among all cancer cases, 52% of patients were obese. 64% of cases had given the history of taking high-fat diet. 58% of females with breast cancer had high breast fat. All breast cancer patients were married and had children. 76.9% of breast cancer patients had either 3 or more than 3 children. In 63% of cases, the first child was male. The total more and total number of female children born to cancer breast patients was less as compared to control. The age at 1st pregnancy was between 24 and 26 years of age in 61.5% of breast cancer patients. 27% of patients had not breast-fed their children at all and only 12% had breastfed for more than a year. For more than a year, 98% of females with breast cancer had their menarche before 15 years of age. 77% of patients had regular menstrual cycles. 71% of patients were menopausal, out of which, 70% had their menopause after 45 years of age and menstrual life of more than 30 years. The history of taking oral contraceptives was present in 2% of cases. Family history of breast cancer was positive in 7% of cases. History of benign breast disease in the past was present in 11% of cases.

REFERENCES

Clinical Study of Foreign Body in Aerodigestive Tract

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Abstract

Aim: The present study of foreign bodies in aerodigestive tract was undertaken to study the various parameters basis of history, examination, and investigations.

Materials and Methods: A total of 72 cases of foreign bodies in aerodigestive tract were admitted in ENT ward of Government Rajaji Hospital were included in the study. All the cases selected and studied in detail for age, sex, incidence, type of foreign body, site of lodgment, common symptoms with which type presented, and the nature of the problem in dealing with these patients during the management.

Results: A total of 72 cases of inpatients were categorized as nasal foreign bodies, digestive tract foreign bodies, and airway foreign bodies. The incidence of admitted foreign body cases (72 cases) was more for males (38 cases) than for females (25 cases). Likewise, it was encountered more in pediatric age group, with more commonly involving 1-2 years of age group.

Conclusion: Foreign in aerodigestive tract is a common clinical problem in otorhinolaryngological practice an evident in this study. Although many does not have an immediate problem of airway, some of them are serious and life-threatening emergencies. Educating the parents about keeping away the article from reach of children and to observe the activity of child will prevent the higher incidence of foreign body in children.

Key words: Aerodigestive, Cricopharynx, Nasopharynx, Otorhinolaryngological

INTRODUCTION

Foreign body ingestion and aspiration are common childhood adverse events hence are the most common causes of morbidity and mortality in infants and children worldwide. They form the third-leading cause of death in children under the age of 1 year and the fourth-leading cause in the age group of 1-6 years.¹ The maximum prevalence is seen between the ages of 1 and 2 years; however, no age group is completely immune. Foreign body is ingested accidentally but occasionally homicidal or suicidal.² Most common foreign bodies in children are coins, but marbles, button, batteries, safety pins, and bottle tops are also reported. In adults, common foreign bodies are bones, dentures, and metallic wires. The foreign bodies that have gone beyond the esophagus will pass uneventfully through the intestinal tract in 70%-80% cases. The foreign bodies in tracheobronchial area pose additional diagnostic problem, which is all the more so in radiolucent foreign bodies.³⁴

Aim

The present study of foreign bodies in aerodigestive tract was undertaken to study the various parameters basis of history, examination, and investigations.

MATERIALS AND METHODS

A total of 72 cases of foreign bodies in aerodigestive tract were admitted in ENT ward of Government Rajaji Hospital from August 2014 to August 2015. All the cases selected and studied in detail for age, sex, incidence, type
Radhakrishnan, et al.: Foreign Body in Aerodigestive Tract

of body, site of lodgment, and common symptoms with which they presented and the nature of the problem in dealing with these patients during the managements. Inclusion criteria: Patients presenting with or without h/o swallowing, inserting or inhaling the foreign body with symptoms such as dysphagia, drooling of saliva, wheeze, and acute respiratory distress were included in the study. Patients fulfilling inclusion criteria were clinically examined, investigated, and treated accordingly.

RESULTS

A total of 72 cases of inpatients were categorized as nasal foreign bodies, digestive tract foreign bodies, and airway foreign bodies; 16 cases in nasal cavity, 40 cases in digestive tract, and 16 cases in airway foreign bodies were selected for the study analysis of positive cases revealed the following observation.

Nasal foreign bodies: 2-3 years had a maximum incidence of nasal FB (37.5%), youngest patient was 1 years, and oldest was 12 years. Digestive tract foreign bodies: Patients aged > 10 years constituted maximum number. Airway foreign bodies: Patient aged 1-2 years is most common (Table 1).

Nasal foreign bodies: 68% were male and 32% were female. Digestive tract foreign bodies: 50% were male and 50% were female. Airway foreign bodies: 69% were male and 31% were female (Table 2).

Nasal foreign bodies: 75% of the cases presented with a history of foreign body nasal cavity and next common symptom is nasal obstruction and foul smelling nasal discharge.

Digestive tract foreign bodies: Throat pain/dysphagia is most common symptom in foreign body digestive tract, next most common symptom is foreign body sensation in throat and drooling of saliva refusal of feeds.

Airway foreign bodies: Dysphonia is most common symptom in foreign body airway, followed by cough and wheeze.

Nasal foreign bodies: FB in nasal cavity is most common sign in anterior rhinoscopy followed by mucopurulent foul-smelling discharge. Digestive tract foreign bodies: Drooling of saliva is most common sign followed by FB in IDL. Airway foreign bodies: Reduced air entry is most common sign in foreign body airway, followed by respiratory distress and crepitations (Table 3).

Nasal foreign bodies: Right nasal cavity is most common site followed by left nasal cavity. Digestive tract foreign bodies: Cricopharynx is most common site followed by upper esophagus. Airway foreign bodies: Right main bronchus is most common site (Table 4).

Nasal foreign bodies: Bead is most common FB in nasal cavity. Digestive tract foreign bodies: Coin is most common FB in digestive tract, followed by metal piece, fish, bone, and mutton piece. Airway foreign bodies: Groundnut is most common FB in airway tract followed by roasted gram (Table 5).

All the cases were managed with orotracheal intubation with general anesthesia in case of esophageal foreign bodies

<table>
<thead>
<tr>
<th>Table 1: Age of the patients</th>
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<tr>
<td>Age group</td>
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<tr>
<td>1-2</td>
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<td>8-9</td>
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<td>&gt;10</td>
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<table>
<thead>
<tr>
<th>Table 2: Gender distribution</th>
</tr>
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<tbody>
<tr>
<td>Site of foreign body</td>
</tr>
<tr>
<td>Nasal</td>
</tr>
<tr>
<td>Digestive</td>
</tr>
<tr>
<td>Airway</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 3: Signs of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of presentation</td>
</tr>
<tr>
<td>Mucopurulent foul smelling discharge</td>
</tr>
<tr>
<td>FB in the nasal cavity</td>
</tr>
<tr>
<td>Bleeding</td>
</tr>
<tr>
<td>Drooling of saliva</td>
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<tr>
<td>FB in IDL</td>
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<tr>
<td>Reduced air entry</td>
</tr>
<tr>
<td>Crepts</td>
</tr>
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<td>Respiratory distress</td>
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<table>
<thead>
<tr>
<th>Table 4: Site of foreign bodies</th>
</tr>
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<tbody>
<tr>
<td>Site of FB</td>
</tr>
<tr>
<td>Nasal cavity</td>
</tr>
<tr>
<td>Nasopharynx</td>
</tr>
<tr>
<td>Poster pharyngeal wall</td>
</tr>
<tr>
<td>Cricopharynx</td>
</tr>
<tr>
<td>Upper esophagus</td>
</tr>
<tr>
<td>Mid esophagus</td>
</tr>
<tr>
<td>Lower esophagus</td>
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<tr>
<td>RT main bronchus</td>
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<td>LT main bronchus</td>
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</table>
and ventilation by side arm of bronchoscope in cases of foreign bodies of tracheo-bronchial tree (Table 6).

DISCUSSION

Foreign body removal from the throat is difficult and is associated with large number of complications in an inexperienced hand. Most common of them are injury to surrounding structures, perforations, injury to vocal cords, and mediastinitis.

The incidence of admitted foreign body cases (72 cases) was more for males (38 cases) than for females (25 cases). Likewise, it was encountered more in pediatric age group, with more commonly involving 1-2 years of age group. Earlier findings of Banerjee et al. and Rothman and Boeckman that the highest incidences of foreign body aspiration and ingestion were in children below 3 years. Since these children lack molar teeth, edibles placed in the mouth are usually broken up but not chewed which they easily ingest aspirate, especially if the child is running, playing, or talking.5,6

Out of 72 cases, 15 cases were seen in the nasal cavity. The most common being ground nut and button battery. Radiological investigation showed the exact site of the foreign body, and it was removed through endonasal endoscopical approach. In the study of Steven C, 47 Coins, 23 sharp objects, 4 Button batteries, and 65 blunt and non-corrosives were found.7

One case presented with foreign body in the nasopharynx and foreign body being an open safety pin. It was identified in X-ray, and endoscopic removal was done. The clinical presentation of these cases varied according to the site of lodgment of a foreign body. Among the foreign body in the air passages, most of them presented with choking, gagging, coughing, and dyspnea followed by a symptomless interval in some cases. One adult female presented with sapota seed after aspirating accidentally, patient was asymptomatic, radio logically the seed was identified in the bronchus and patient underwent rigid bronchoscope under general anesthesia, and first attempt failed due to the slippery nature of the seed. Then, patient underwent flexible bronchoscope and this one too failed. Again patient was planned for rigid bronchoscopy with modified position of the patient, and foreign body was successfully removed under general anesthesia. During post-operative period, no complication was identified. The foreign bodies in the food passage presented with various clinical presentation such as dysphagia, painful swallowing, chest discomfort, chest pain, throat pain, hematemesis, and vomiting.8,11

CONCLUSION

Foreign bodies in aerodigestive tract are a common clinical problem in otorhinolaryngological practice, an evident in this study. Although many does not have an immediate problem of airway, some of them are serious and life-threatening emergencies. Such is the clinical spectrum of presentation. Educating the parents about keeping away the article from reach of children and to observe the activity of child will prevent the higher incidence of a foreign body in children.

REFERENCES


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Clinical and Anthropometric Profile of Congenital Heart Disease in Children Admitted in Pediatric Ward

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Abstract

Introduction: Congenital heart disease (CHD) is defined as an abnormality in “cardio circulatory” structure or function that is present since birth; incidence being 8 CHD’s per 1000 live births. Early establishment of diagnosis is important as newer available treatment modalities can significantly decrease mortality and morbidity. With limited resources in developing countries like India, clinical acumen still forms the backbone of diagnosis and later to be confirmed by echocardiography and to deliver the appropriate management at the right time.

Materials and Methods: Patients from 1 month to 14 years of age with features suggestive of CHD admitted in Department of Pediatrics, Netaji Subhash Chandra Bose Medical College, Jabalpur, were enrolled during the study period, that is, October 2014-September 2015 who fulfilled the inclusion and exclusion criteria. A standard pro forma was used during initial evaluation to get the detailed history and the clinical examination findings along with chest X-ray and electrocardiogram were evaluated, and clinical diagnosis is ascertained and subjected to two-dimensional echocardiographic evaluation to confirm the diagnosis.

Results: We observed that the major types of CHDs were ventricular septal defect (VSD) (33.3%), atrial septal defect (18.2%), tetralogy of fallot (TOF) (15.2%), and patent ductus arteriosus (6.1%). Male-to-female ratio was 2:1. Common symptoms were fever (78.7%) breathlessness (72.7%), fatigue (54.8%), anemia (45.5%), cough (43.5%), poor weight gain (40.9%), recurrent chest infection (34.8%), feeding problems (18.1%), palpitation (21.7%), and bluish discoloration of lips and fingertips (18.1%). Murmur with or without thrill and cardiomegaly was the most important cardiac finding. 54.5% of the study group children had their weight for age below −3 standard deviation.

Conclusion: Acyanotic heart diseases were found to be more common than cyanotic disease. VSD was found to be the most common acyanotic disease and TOF was found to be the most common cyanotic CHD. Majority of the children were malnourished and weight was found to be more affected than height in both cyanotic and acyanotic groups. Both height and weight were affected more in cyanotic group when compared to acyanotic group.

Key words: Anthropometry, Congenital heart disease, Echocardiography

INTRODUCTION

Congenital heart disease (CHD) comprises one of the major diseases in pediatric age group and is one of the leading causes of death in children with congenital malformations.¹ CHD by definition is the structural or functional heart disease present at the time of birth, even if it is detected later on.²

The incidence of CHD in the normal population is approximately 0.5-0.8% of live-born children, with a higher percentage in those aborted spontaneously or still born.³ In our country, majority of child births still takes place at home and routine neonatal screening is not common, so it is difficult to calculate the true birth prevalence of CHD.
To detect as many children with CHD as possible, including those with mild lesions, very intensive studies are required which may not be available at all hospitals.

Two-dimensional echocardiography (ECHO) has revolutionized the diagnosis and management of cardiac malformations. It is a non-invasive investigation that can precisely diagnose most CHDs as well as offer treatment options, whether medical or surgical.1

CHD may present at any age group ranging from neonate to adolescence and clinical presentation varies, from being totally asymptomatic to fatal complications.4

CHD, if left untreated is an important cause of morbidity and mortality in children, therefore early diagnosis and proper intervention is most important.

Many cases of CHD attend pediatric unit at Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, and studies regarding relative frequency, age, sex distribution, and clinical profile of CHD are very scanty from this region.

MATERIALS AND METHODS

This was a prospective, observational study conducted in the Department of Pediatrics. 66 patients were registered for this study over 1 year from January 2014 to 2015.

This study is carried out in children aged 0-14 years old. The cases with suspected CHD will be studied and confirmed by electrocardiography, chest X-ray, and ECHO. Written consent will be taken from the parents. All cases will be evaluated using the following variables age, sex, signs and symptom of CHD, type of CHD based on ECHO report, length, weight, Z-scores will be calculated for height/length for age, weight for age and weight for height/length, mid-upperarm circumference (below age of 5 years), duration of hospital stay, and immediate outcome. Height is measured in centimeters using infantometer below the age of 2 years and stadiometer above the age of 2 years and weight in kilograms using infant weighing scale and adult weighing scale. Head circumference is recorded at the level of supraorbital ridge to occipital protuberance in centimeters.

Inclusion Criteria
1 month-14 year’s both male and female with CHDs clinically detected and confirmed by investigations.

Exclusion Criteria
1. Age <1 month
2. Children with acquired heart disease
3. Unstable patients who died before the confirmation of diagnosis.

RESULT

This study included 66 patients of Congenital heart disease. 36 (54.5%) patients presented before 6 months of life. 10 of them, that is, 15.2% presented between 6 and 12 months, 4 patients (6.1%) presented between 1 and 2 years of age, 8 patients (12.1%) presented between 2 and 4 years, and similarly 8 patients (12.1%) presented after 4 years of age. There were 44 male and 22 female patients in our study and the ratio being 2:1.

Acyanotic CHD outnumbered cyanotic CHD. The most common lesion was ventricular septal defect (VSD) alone 36 (33.3%), followed by atrial septal defect (ASD) alone 22 (18.2%), tetralogy of fallot (TOF) 12 (15.2%), complex cyanotic 8 (12.1%), and patent ductus arteriosus (PDA) 4 (6.1%). 6 (9.09%) patients had ASD with VSD and 2 patients (3.03%) each in groups ASD + VSD and PDA + VSD + PDA.

Clinical symptoms observed were fever 52 (78.79%), breathlessness 48 (72.73%), feeding problem 12 (18.18%), and cyanosis 12 (18.18%). Poor weight gain was presentation in 8 (12.12%) cases, and 14 (21.21%) patients presented with other symptoms.

History of first-degree consanguineous marriage was there in 18 parents (27.27%) and CHD in sibling was present in 2 children (3.03%). 4 patients had cleft lip and cleft palate. 2 (3.03%) children had Down syndrome. Imperforate anus, inguinal hernia, and biliary atresia were found in one patient each.

Examination findings observed in our study were respiratory distress 48 (72.73%), cyanosis 12 (318.18%), pallor 24 (36.3%), shock 2 (3.03%), and respiratory failure 2 (3.03%).

In our study, 52 (78.79%) children with CHD presented with murmur, 10 (15.15%) children (6.06%) had abnormal 1st or 2nd hear sounds on auscultation, and 10 children had normal findings on auscultation at presentation(Table 1-5).

Anthropometry

Weight for age

In children with acyanotic CHD, 26 (55%) of patients were found to have weight for age < −3 standard deviation (SD) and 12 (25%) of patients were having weight for age falling between −2 SD and −3 SD. In children with cyanotic CHD, 10 (55.5%) patients were found to have weight for age < −3 SD and 4 (22.2%) patients were having weight for age falling between −2 SD and −3 SD.
Height for age (H/LFA)
A total of 14 (48.48%) children with acyanotic heart disease had their height for age below −3 SD and 12 (25%) of patients had their height for age falling between −2 SD and −3 SD. 2 (11.1%) of children with cyanotic heart disease had their height for age below −3 SD and 6 (33.3%) of patients had their height falling between −2 SD and −3 SD.

Weight for height
A total of 4 (83.3%) children with acyanotic heart disease had their height for age below −3 SD and 18 (37.5%) of patients had their height for age falling between −2 SD and −3 SD. None of the children with cyanotic heart disease had their height for age below −3 SD and 6 (36.36%) of patients had their height falling between −2 SD and −3 SD.

Body mass index (BMI)
A total of 13 (27.2%) children with acyanotic heart disease had their BMI below −3 SD and 8 (16.6%) of patients had their BMI falling between −2 SD and −3 SD. 6 (30.77%) children with cyanotic heart disease had their BMI below −3 SD and 2 (33.33%) children had their BMI falling between −2 SD and −3 SD.

Mid-upper arm circumference (MUAC)
It was taken in children of age group 6 months-5 years (12 children). Among them, 75% had their MUAC < 12.5 cm and 33.33% had < 11.5 cm.

Head circumference
Out of the total 66 children, 8 (12.1%) children had microcephaly.

DISCUSSION

Age at Presentation (Table 5-10)
The age at detection of CHD varies due to the normal hemodynamic alterations occurring after birth such as fall in pulmonary vascular resistance, physiological, and anatomical closure of PDA. Many CHDs, especially minor defects tend to be asymptomatic and hence missed unless specifically sought.\(^5\)

A study by Jatav et al.\(^5,6\) showed only 37.06% of CHD cases were detected by the age of 1 year and up to 15.51% were detected after the age of 18 year, so this delay in the diagnosis can be explained due to lack of awareness, health facilities, and pediatric care program’s in India.\(^7\)

Shah et al.\(^8\) in their study showed that out of 84 CHD cases, 8 children (9.1%) presented before 1 month of age and 39 cases (46.4%) presented between 1 and 12 months. This study showed that CHD presented more frequently during infancy. 31% of cases presented between 1 and 5 years, 4.8% between 5 and 9 years and 8.3% after 9 years.

Khan et al.\(^9\) study on patients from birth to 10 years of age with clinical and ECHO evidence of CHD showed more than two-thirds (71%) patients were < 1 year of age. Out of these, 79 (69.3%) patients had acyanotic and 35 (30.7%) had cyanotic congenital heart lesions.
da Silva et al. studied on 135 hospitalized children with CHD in Brazil. The average age was 4.74 months (SD ± 3.78) in those children, with 25% up to 1 month and 75% up to 8 months old. However, the highest frequency occurred in the age range of up to 3 months (46.7%).

In our study, 18 out of 33 patients were presented before 6 months of life (54.5%). Five of them, that is, 15.2% presented between 6 and 12 months, 6.1% presented between 1 and 2 years of life, and 12.1% presented between 2 and 4 years of life. Four patients (12.1%) presented after 4 years of age.

### Gender Distribution
CHD as a whole occurs with equal frequency in male and females but some lesions such as aortic stenosis (AS), coarctation of aorta, transposition of great vessels, and TOF are more common in males, whereas ASDs are more common in females.

Khan et al. stated in their study that out of 114 patients 60 (52.6%) were males and 54 (47.4%) were females with a male-to-female ratio of 1.1:1.

da Silva et al. also observed 66.7% were male children, corresponding to two boys for one girl, and this proportion was higher (four boys for one girl) in extreme ends of the confidence intervals, whereas the lowest percentage of female children is 20%, and the highest for male 80%.

In our study, total number of patients was 66, out of which 33 were male and 22 were female with a male-to-female ratio of 2:1.

### Clinical Presentation
The clinical presentation of CHD varies according to the type and severity of the defect. In infancy and childhood, the usual presenting features are cyanosis, digital clubbing, murmur, syncope, squatting, heart failure, arrhythmia, and failure to thrive. The adolescent and adults present with heart failure, murmur, arrhythmia, cyanosis, hypertension, and late consequences of previous cardiac surgery (e.g., arrhythmia, heart failure).

Breathlessness 60%, fatigue 54.8%, cough 43.5%, poor weight gain 41.7%, recurrent chest infection 34.8%, fever 28.7%, feeding problem 26.1%, palpitation 21.7%, cyanotic spell 13%, and convulsion 1.7% were the clinical presentations observed by Sharmin et al.

Recurrent respiratory tract infections were the most common symptom (40%) in a study by Smita et al. in rural India in 2011-2013.

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**Table 5: Clinical presentation of CHD**

<table>
<thead>
<tr>
<th>Complaints</th>
<th>Frequency (%)</th>
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<tbody>
<tr>
<td>Fever</td>
<td>52 (78.79)</td>
</tr>
<tr>
<td>Breathing difficulty</td>
<td>48 (72.73)</td>
</tr>
<tr>
<td>Feeding difficulty</td>
<td>12 (18.18)</td>
</tr>
<tr>
<td>Poor weight gain</td>
<td>27 (40.9)</td>
</tr>
<tr>
<td>Other symptoms</td>
<td>14 (21.21)</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>12 (18.18)</td>
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<tr>
<td>Pallor</td>
<td>24 (36.36)</td>
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<tr>
<td>Respiratory distress</td>
<td>48 (72.73)</td>
</tr>
<tr>
<td>Shock</td>
<td>2 (3.03)</td>
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<tr>
<td>Respiratory failure</td>
<td>2 (3.03)</td>
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<tr>
<td>Murmur</td>
<td>52 (78.79)</td>
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<tr>
<td>Abnormal sounds</td>
<td>10 (15.15)</td>
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<tr>
<td>Anemia</td>
<td>30 (45.5)</td>
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</tbody>
</table>

CHD: Congenital heart disease

**Table 6: Prevalence of undernutrition, failure to thrive, short stature, and microcephaly in children with acyanotic CHD**

<table>
<thead>
<tr>
<th>Standard Deviation</th>
<th>WFA</th>
<th>L/HFA</th>
<th>WFI/A</th>
<th>HC</th>
<th>BMI</th>
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</thead>
<tbody>
<tr>
<td>&lt;−3 SD</td>
<td>26 (54.1)</td>
<td>14 (29.1)</td>
<td>4 (83.3)</td>
<td>4 (8.3)</td>
<td>13 (27)</td>
</tr>
<tr>
<td>−3 to &lt;−2 SD</td>
<td>12 (25)</td>
<td>12 (25)</td>
<td>18 (37.5)</td>
<td>40 (83.3)</td>
<td>8 (16.6)</td>
</tr>
<tr>
<td>&gt;−2 SD</td>
<td>10 (20)</td>
<td>22 (45.8)</td>
<td>26 (54.1)</td>
<td>4 (8.3)</td>
<td>27 (56.2)</td>
</tr>
</tbody>
</table>

SD: Standard deviation, CHD: Congenital heart disease

**Table 7: Prevalence of undernutrition, failure to thrive, short stature, and microcephaly in children with cyanotic CHD**

<table>
<thead>
<tr>
<th>Standard Deviation</th>
<th>WFA</th>
<th>L/HFA</th>
<th>WFI/L</th>
<th>HC</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;−3 SD</td>
<td>10 (55.5)</td>
<td>2 (11.1)</td>
<td>(0)</td>
<td>4 (22.2)</td>
<td>6 (33.33)</td>
</tr>
<tr>
<td>−3 to &lt;−2 SD</td>
<td>4 (22.2)</td>
<td>6 (33.3)</td>
<td>6 (36.36)</td>
<td>14 (77.7)</td>
<td>2 (11.1)</td>
</tr>
<tr>
<td>&gt;−2 SD</td>
<td>4 (22.2)</td>
<td>10 (55.5)</td>
<td>12 (27.27)</td>
<td>0</td>
<td>10 (55.5)</td>
</tr>
</tbody>
</table>

SD: Standard deviation, CHD: Congenital heart disease

**Table 8: Parental consanguinity**

<table>
<thead>
<tr>
<th>History of consanguinity</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18 (27.27)</td>
</tr>
<tr>
<td>No</td>
<td>48 (72.73)</td>
</tr>
</tbody>
</table>

**Table 9: CHD in sibling**

<table>
<thead>
<tr>
<th>CHD in sibling</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2 (3.03)</td>
</tr>
<tr>
<td>No</td>
<td>64 (96.97)</td>
</tr>
</tbody>
</table>

CHD: Congenital heart disease

**Table 10: Associated malformations**

<table>
<thead>
<tr>
<th>Malformations</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down syndrome</td>
<td>2 (3.03)</td>
</tr>
<tr>
<td>Cleft lip/palate</td>
<td>4 (6.06)</td>
</tr>
<tr>
<td>Imperforate anus</td>
<td>2 (3.03)</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>2 (3.03)</td>
</tr>
<tr>
<td>Biliary atresia</td>
<td>2 (3.03)</td>
</tr>
</tbody>
</table>

Khan et al. stated in their study that out of 114 patients 60 (52.6%) were males and 54 (47.4%) were females with a male-to-female ratio of 1.1:1.
In a study by Sandeep et al., the most common examination finding was tachypnea (88%) followed by tachycardia (76%). Other findings were cyanosis (26%), fever (24%), and 6% of infants had edema.

The clinical symptoms we observed in our study were fever 52 (78.79%), breathlessness 48 (72.73%), feeding problem 12 (18.18%), and cyanosis 12 (18.18%). Poor weight gain was presentation in 8 (12.12%) cases and 14 (21.21%) patients presented with other symptoms.

**Relative Frequency of Lesions**

The relative frequency of the most common lesions varies with different reports but nine common lesions form 80% of CHD as stated by Jackson et al. in their study. These are VSD (36%), ASD (5%), patent arterial duct (9%), atrioventricular septal defect (AVSD) (4%), pulmonary stenosis (PS) (9%), AS (5%), coarctation of aorta (5%), transposition of great arteries (4%), and TOF (4%). The other 20% of CHD consists of many rare or complex lesions.

In our study, VSD was the most common congenital heart defect which was accounting for 33.3% of CHD cases and correlates well with the reported range of 21-53% in the literature. ASD was the second most common CHD in our study comprising 18.2%. This correlates well with the frequency of 10-23% reported in various Indian studies, but it is higher than 6-8% reported from Western countries. TOF was the most common cyanotic CHD comprising 15.2%, correlating well with other studies.

**Anthropometry**

Mechanisms for growth deficiency in CHD are multifactorial including associated chromosomal anomalies/genetic syndromes, inadequate nutrition due to feeding difficulties, and poor nutritional absorption from the digestive tract in chronic congestive heart failure (CHF). However, inadequate caloric intake appears to be the most important cause of growth failure in CHD. A characteristic feeding pattern of children with CHD is defined, with a large variation in caloric intake.

Furthermore, increased caloric support is required to sustain the increased myocardial, respiratory, and neurohumoral functions in CHD-related heart failure. Chronic CHF and chronic underoxygenation in CHD impair cellular metabolism and cell growth, whereas repeated chest infections demand an increased metabolism.

Smita et al. performed a study on clinical profile of patients with acyanotic CHD in pediatric age group in rural India. In their study, weight of 68% cases was below 10th percentile while height was below 10th percentile in 25% of cases.

According to da Silva et al., variables significant for malnutrition in logistic regression models were sex, type of heart disease, birth weight, birth length, subscapular thickness, triceps thickness, and cephalic circumference.

**Associated Anomalies**

In the study by Sandeep et al., the most common associated anomaly was involving the musculoskeletal system (58.33%) which includes Congenital Tepiles Equinovarus, Polydactyly(CTEV), and webbed neck. Down syndrome was seen in 5 children. In our study, two patients had cleft lip and cleft palate. One child had Down syndrome. Imperforate anus, inguinal hernia, and biliary atresia were found in 2 patients each.

**Parental Consangunuity**

Becker et al. in his study found that the first-cousin consangunuity was significantly associated with VSD, ASD, AVSD, PS, and pulmonary atresia. There was no relationship between consangunuity and TOF, tricuspid atresia, AS, coarctation of the aorta, and PDA.

In the present study, the history of first-degree consangunuous marriage was there in 18 (27.27%).

**CONCLUSION**

CHD is the leading cause of death in children with malformation. Acyanotic heart diseases were found to be more common than cyanotic disease. VSD was found to be the most common acyanotic disease, and TOF was found to be the most common cyanotic CHD. Weight was found to be more affected than height in both cyanotic and acyanotic groups. Both height and weight were affected more in cyanotic group when compared to acyanotic group.

**REFERENCES**

Karthiga, et al.: Clinical and Anthropometric Profile of Congenital Heart Disease in Children Admitted in Pediatric Ward


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Outcome of Laparoscopic Cholecystectomy in Tertiary Referral Hospital

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INTRODUCTION

Cholecystectomy is one of the most commonly performed abdominal surgical procedures previously and is performed laparoscopically worldwide nowadays. Laparoscopic cholecystectomy (LC) is considered the “gold standard” for the surgical treatment of gallstone disease and benign gallbladder diseases. This procedure results in less post-operative pain, better cosmesis, shorter hospital stays and disability from work than open cholecystectomy.¹⁻³ LC remains an extremely safe procedure, with a mortality of 0.22-0.4%. The prevalence of gallstones increases with age in both sexes and in nearly all populations; in older individuals the prevalence ranges from 20% to 30% and increases to 80% for institutionalized patients older than 90 years, LC decreases post-operative pain, decreases the need for post-operative analgesia, shortens the hospital stay from 1 week to <24 h, and returns the patient to full activity within 1 week (compared with 1 month after open cholecystectomy).⁴⁻⁵ LC also provides improved cosmesis and improved patient satisfaction as compared with open cholecystectomy.

Although direct operating room and recovery room costs are higher for LC, the shortened length of hospital stay leads to a net savings. More rapid return to normal activity may lead to indirect cost savings.⁶⁻⁹

MATERIALS AND METHODS

This is a retrospective study of all LC done over 1 year period from January 2015 to June 2016 in the Department of Surgery, Government Thoothukudi Medical College, Thoothukudi. Our patient’s demographic data, body mass index (kg/m²), indication for surgery, American Society of Anesthesiologists physical status class, previous abdominal surgery, duration of procedure and post-operative hospital
The exclusion criteria were biochemical or radiological features suggestive of common bile duct (CBD) obstruction. The patients were counseled on the procedure. The possibility of a conversion was discussed with each patient, following which an informed consent was obtained. Each patient had perioperative prophylactic antibiotics consisting of 1 g of ceftriaxone, respectively. The American Technique for LC was adopted for all operations under general or regional anesthesia as considered safe by the anesthetist. Every patient had intraoperative nasogastric tube decompression of the stomach which was removed 12-16 h after surgery. Pneumoperitoneum was created using the open technique through the umbilical port. Other ports used were a 10 mm port in the epigastrium and two other 5 mm ports. The cystic duct and artery were divided between titanium clips after dissection of the adhesions around the Calot’s triangle. The gallbladders were extracted through the epigastric port without retrieval bags. All operations were performed by the same set of surgeons who had been trained for the procedure. Data analysis was performed.

RESULTS

In this present study consisting of 50 cases, planned for LC about 32% (16 cases) belongs to 20-30 age groups and 36% (18 cases) belongs to more than 50 age group (Figure 1).

The period of study is from January 2015 to June 2016, about 18 months. Gender wise female predominance 92% (46 cases) seen. 50% (25 cases) of patients belongs to blood group O, and only 6% (3 cases) had AB blood group. The conversion rate is only 4% (2 cases) that too due to technical difficulties and pre-operative procedure induced fibrosis in Calot’s triangle. Wound infection rate was 16% (8 cases) due to bile spillage through the port site retrieval of gallbladder. Only 2% (one case) had severe intraoperative bleeding which had been managed by creating another 5 mm port and applying titanium clip over bleeding point (Table 1).

DISCUSSION

The most common indication for cholecystectomy in our center was calculus cholecystitis. However, the demand for LC in developing countries will increase as more people become aware of its availability.

Majority (88%) of the patients were female, with a mean age similar to other publications. Although gallbladder diseases are more commoner in females the aesthetics of laparoscopic surgery was a major factor in acceptance of LC in females. Our comorbidity rate was 10%. However, hypertension was the predominant comorbidity as opposed to Type 2 diabetes reported by them. 57.1% of our patients were either overweight or obese. The other comorbid conditions, we have come across are three cases of hypothyroidism and one case of tracheal stenosis who required a pre-operative tracheostomy. However, there was no statistical relationship with surgical outcome of LC as corroborated by other reports. 9 (21.4%) patients with previous abdominal incisions were operated without bowel injury.

Operating time ranged from 45 to 75 min with a mean 60 min, this compared favorably with reports from both within and outside the country. The upper end of the range was at the initial phase of the series when the learning curve was steep. This dropped and plateaued, with the average operating time of an hour. Our conversion rate of 4% is at the upper limit of reported conversion rates in larger series of between 4% and 7%. The reasons for converting are technical difficulty due to fibrosis of previous stenting procedures.

Reported incidences of CBD injuries during LC have ranged from 0.2% to 3.4%, which is higher than the 0.1-0.2% incidence in open cholecystectomy. The incidence of CBD injury (2%) is within the quoted range. The surgical site infection rate of 8% is explained by the occasional spillage of bile when extracting the gall bladder without using retrieval bags. These retrieval bags are scarce and

![Figure 1: Distribution of age group](image)

<table>
<thead>
<tr>
<th>Complication</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion rate</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Wound infection</td>
<td>8 (16)</td>
</tr>
<tr>
<td>Hematoma formation</td>
<td>0 (0)</td>
</tr>
<tr>
<td>CBD injury</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Intraoperative bleeding</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

CBD: Common bile duct
expensive and hence were unavailable for use at the initial phase. We have however started using retrieval bags for specimen retrieval in recent cases, to forestall the possibility of port site infection or abscess.

In our series, the average post-operative hospital stay was 2.7 days, which is much shorter than 7.5 days for open cholecystectomy in our center. In comparison to a previous audit on our initial set of patients, there is a significant reduction in both operation time and duration of admission. The patients who were converted spent approximately a week while the patient who had CBD injury was referred to the higher center for further management. There is an association between the duration of surgery and duration of symptoms. This may be attributed to the presence of perilonic adhesions from recurrent inflammation thus making the procedure technically more difficult. Similarly, there is a relationship between the presence of perilonic adhesions; and duration of post-operative care.25-26 Prolonged duration of symptoms and late presentation were associated with fibrosis of the gallbladder consequently making grasping and handling difficult thus prolonging the duration of surgery. The extended or increased tissue dissection may account for slightly longer duration of post-operative care.27-30 Our patients were followed up in the outpatient department for at least 6 months, and none had a port site incision hernia during the period of follow-up. This was because of our follow-up protocol: First visit a week after discharge, second visit between 1 and 3 months later, and the third visit at 6 months after surgery.

Despite the low volume of patients and the absence of fluoroscopy in our hospital as in many centers in developing countries, our results are comparable with high volume centers. These figures have been achieved by careful patient selection. Consequently, the demand for laparoscopic surgery is increasing in developing countries. We need to develop guidelines based on local patient demography and available instruments.

**CONCLUSION**

These results support the view that LC is a safe, cost-effective method for performing cholecystectomy with a remarkable improvement in patient recovery time.

**REFERENCES**


Source of Support: Nil, Conflict of Interest: None declared.
Can Antibiotic-mixed Polymethyl Methacrylate-wrapped Intramedullary Nail be used for Post Nailing Infected Tibial Non-union as Definitive Treatment?

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INTRODUCTION

Infection after intramedullary nailing is reported as 1-7.9% in closed fractures in low and middle income countries and up to 25% in type III open tibial fractures.¹⁻⁵ Meticillin-resistant Staphylococcus aureus is the most common organism.⁶ One of the methods of treatment for post-nail implanted infected non-union of tibial diaphyseal fractures is use of antibiotic-impregnated polymethyl methacrylate (PMMA)-wrapped intramedullary non-locking nail placement to eradicate intramedullary and overall regional infection control, and long-duration retention of cement nail has been used in some situation.⁶⁻⁸ Secondary procedure such as definitive interlocking intramedullary nailing (ILIMN) and more cumbersome Ilizarov technique do also yield satisfactory success rate.⁶⁻¹¹ We investigate the usefulness of antibiotic-mixed PMMA bone cement-wrapped nail

Abstract

Introduction: Standard protocol for the management of intramedullary infected ununited fracture of tibial shaft is implantation of suitable antibiotic-impregnated bone cement-coated nail to eradicate infection followed by definitive interlocking intramedullary fixation within 6 weeks. In this study we investigate the utility of antibiotic cement coated nail to the end point.

Materials and Methods: A total of 23 (M = 17, F = 6) unilateral cases of mean age 32.6 years (ranges 15-68 years) are included in this prospective study. Initially, 14 had closed and 9 had open fractures. Pre-operative culture showed Staphylococcus aureus in 21 cases, and two had mixed infection of S. aureus and Pseudomonas aeruginosa. All were sensitive to Vancomycin. About 6 mm V nail with Herzog bend was used. 4 g vancomycin in 40 g methyl methacrylate polymer was used to wrap the nail after mixing. Medullary canals are reamed and thoroughly washed and prepared nails are introduced in the medullary canal. After 2 weeks, patients are permitted to bear weight with patellar tendon bearing cast. Nails are removed with union usually 4 months after insertion.

Results: Average follow-up was 30 months (range 7-63 months), and results at 1 year are produced. 20 achieve control of infection within 5 weeks, and in 2 cases, the same procedure was repeated and infection controlled. One case who failed to achieve control of infection was subjected to distraction histogenesis. Eventually, by this technique 21 of the 23 infection-free non-unions are united. However, in one case, larger-sized interlocking nail was applied. Ankle and knee joint movements show terminal 10% restrictions. According to Klemm and Borner scoring protocol, results are finally graded as 9, 12, 0, and 2 for excellent, good, fair, and poor, respectively. In initial 3 cases, final cement nail removal was a problem.

Conclusion: This cost-effective protocol is very simple and can be done in any setup. Further study is proposed.

Key words: Antibiotic mixed bone cement, Infection, Nail, Non-union, Tibia
as method of definitive treatment in such situation to avoid two more operations.

MATERIALS AND METHODS

In this prospective case series, a study conducted in a newly recognized rural Murshidabad Medical College of eastern India during January 2011-June 2017 includes 23 (M = 17, F = 6) unilateral cases. Mean age being 32.6 years (ranges 15-68 years) where right side was affected in 14 cases. Ethical committee approval and informed consent of participants are obtained duly. 11 of them was smoker, and 3 and 5 had diabetes and hypertension, respectively, and of them, 2 had combined diabetes and hypertension. Multiple ununited fractures of lower limbs, significant bone loss, and associated vascular or renal complications of diabetes are excluded from this study. 15 patients received initial treatment with ILIMN in other center. In 9 patients, initial injury was open fracture. Of them, 3 had reamed nail insertion during debridement within 24 h and other 6 had external fixation followed by ILIMN application within 5-21 days also from different centers. Two cases presented with broken nail (Table 1). Pre-operative pus culture isolated *S. aureus* in 19 cases, whereas in two cases, it was mixed infection with *Pseudomonas aeruginosa*. All were sensitive to vancomycin and 17 were sensitive to cefuroxime also. In remaining two cases, no organism can be isolated with repeated culture. Perioperative medullary material isolates *S. aureus* in 11 cases.

### Table 1: Patient-related demographic data including course of treatment

<table>
<thead>
<tr>
<th>Sex-age</th>
<th>Side</th>
<th>Close/open</th>
<th>Comorbid conditions</th>
<th>Date of injury</th>
<th>Date of IM nailing</th>
<th>Date of PMMA nailing</th>
<th>Date of PTB</th>
<th>Date of removal of PTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-32</td>
<td>L</td>
<td>Close</td>
<td>Smoker</td>
<td>27.02.11</td>
<td>03.03.11</td>
<td>17.04.12</td>
<td>07.05.12</td>
<td>09.07.12</td>
</tr>
<tr>
<td>F-15</td>
<td>L</td>
<td>Open</td>
<td></td>
<td>14.04.11</td>
<td>14.04.11</td>
<td>12.11.11 and 10.12.11</td>
<td>11.01.12</td>
<td>06.03.12</td>
</tr>
<tr>
<td>M-22</td>
<td>R</td>
<td>Close</td>
<td></td>
<td>11.09.11</td>
<td>17.09.11</td>
<td>14.04.12</td>
<td>04.05.12</td>
<td>01.08.12</td>
</tr>
<tr>
<td>M-37</td>
<td>R</td>
<td>Close</td>
<td>Smoker</td>
<td>21.06.12</td>
<td>02.07.12 (open)</td>
<td>28.08.13</td>
<td>12.09.13</td>
<td>11.12.13</td>
</tr>
<tr>
<td>M-68</td>
<td>R</td>
<td>Open</td>
<td>DM/H'tensive</td>
<td>07.09.12</td>
<td>12.09.12</td>
<td>20.09.13</td>
<td>19.10.13</td>
<td>06.01.14</td>
</tr>
<tr>
<td>F-39</td>
<td>R</td>
<td>Close</td>
<td>H'tensive</td>
<td>10.10.12</td>
<td>14.03.12</td>
<td>02.06.12</td>
<td>26.06.12</td>
<td>15.09.12</td>
</tr>
<tr>
<td>F-41</td>
<td>R</td>
<td>Close</td>
<td></td>
<td>22.05.13</td>
<td>23.05.13</td>
<td>20.12.13</td>
<td>05.01.14</td>
<td>09.03.14</td>
</tr>
<tr>
<td>M-27</td>
<td>L</td>
<td>Open</td>
<td>Smoker</td>
<td>08.09.13</td>
<td>24.09.13 (nail broke)</td>
<td>26.03.14 + (surface beads BG)</td>
<td>10.05.14</td>
<td>01.07.14</td>
</tr>
<tr>
<td>M-24</td>
<td>L</td>
<td>Open</td>
<td>Smoker</td>
<td>12.03.14</td>
<td>02.04.14 (nail broke)</td>
<td>13.07.14 + (surface beads BG)</td>
<td>28.08.14</td>
<td>02.10.14</td>
</tr>
<tr>
<td>F-29</td>
<td>L</td>
<td>Open</td>
<td></td>
<td>21.07.14</td>
<td>09.08.14</td>
<td>26.01.15</td>
<td>20.02.15</td>
<td>19.06.15; non-union; exchange nailing 0</td>
</tr>
<tr>
<td>M-53</td>
<td>L</td>
<td>Close</td>
<td>H'tensive</td>
<td>13.01.15</td>
<td>15.01.15</td>
<td>16.10.15</td>
<td>30.10.15</td>
<td>20.01.16</td>
</tr>
<tr>
<td>M-32</td>
<td>R</td>
<td>Close</td>
<td>Smoker</td>
<td>11.03.15</td>
<td>14.03.15</td>
<td>12.10.15</td>
<td>26.10.15</td>
<td>03.01.16</td>
</tr>
<tr>
<td>F-20</td>
<td>R</td>
<td>Close</td>
<td></td>
<td>19.03.15</td>
<td>23.03.15</td>
<td>08.08.15</td>
<td>27.08.15</td>
<td>04.12.15</td>
</tr>
<tr>
<td>M-31</td>
<td>R</td>
<td>Open</td>
<td>Smoker</td>
<td>10.06.15</td>
<td>10.06.15</td>
<td>13.09.15 + (surface beads BG)</td>
<td>27.10.15</td>
<td>13.12.15</td>
</tr>
<tr>
<td>M-25</td>
<td>L</td>
<td>Close</td>
<td>Smoker</td>
<td>17.06.15</td>
<td>19.06.15</td>
<td>18.01.16</td>
<td>03.02.16</td>
<td>21.04.16</td>
</tr>
<tr>
<td>F-28</td>
<td>L</td>
<td>Open</td>
<td></td>
<td>27.08.15</td>
<td>27.08.15</td>
<td>22.01.16</td>
<td>10.02.16</td>
<td>21.04.16</td>
</tr>
<tr>
<td>M-24</td>
<td>R</td>
<td>Open</td>
<td></td>
<td>03.09.15</td>
<td>13.09.15</td>
<td>03.01.16</td>
<td>15.01.16</td>
<td>30.03.16</td>
</tr>
<tr>
<td>M-33</td>
<td>R</td>
<td>Close</td>
<td>Smoker</td>
<td>09.11.15</td>
<td>12.11.15</td>
<td>11.06.16</td>
<td>23.06.16</td>
<td>30.08.16</td>
</tr>
<tr>
<td>M-55</td>
<td>R</td>
<td>Close</td>
<td>H'tensive</td>
<td>02.12.15</td>
<td>03.12.15</td>
<td>07.06.16</td>
<td>21.06.16</td>
<td>20.09.16</td>
</tr>
<tr>
<td>M-23</td>
<td>L</td>
<td>Close</td>
<td>Smoker</td>
<td>03.03.16</td>
<td>06.03.16</td>
<td>05.08.16</td>
<td>19.08.16</td>
<td>14.10.16</td>
</tr>
</tbody>
</table>

bear weight from partial to full at 2 months post-operatively. Cast discarded after 2-3 months, and ankle mobilizing exercises started (Figure 3). The PMMA-impregnated nail is removed after 3-5 months when the fracture adequately consolidated (Figure 4). In two cases, after 4 and 5 weeks, same procedure was repeated to control infection. Another 4 cases with more aggressive stage II osteomyelitis with soft-tissue infection surface debridement as well as removal of sequestrum and antibiotic cement beads are placed. Surface beads were removed after 4 weeks with control of infection, and at that time, cancellous autologous bone grafts were applied where there was partial cortical bone loss. In 2 cases with delayed consolidation beyond 3 months of PTB application, it is replaced with a leg guard for additional 4-6 weeks (Table 1).

RESULTS

Patients are followed up with removal of PTB, once in every 6 months for 1 year and then once yearly. Assessment done using “Klemm and Borner” protocol in a modified way. Mean follow-up was 30 months (range 7-63 months). In this series, overall infection is controlled in 22 (95.7%) cases, but supplementary procedures were adopted in five. Of which in two cases, second, antibiotic-mixed cement nail was repeated after 5 week and surface antibiotic cement beads and bone grafting were combined in 3 cases. Union achieved in 21 (91%) cases in average of 13.3 weeks (range 10-20 weeks). One case, who was persistent smoker and diabetic infection, cannot be eradicated and failed to unite. Subsequently, he was treated using ring fixator. In another case, infection was controlled but failed to achieve union where PMMA-impregnated nail was replaced with larger diameter locking nail using exchange nailing technique.

Finally, the overall results were rated as 9, 12, 0, and 2 for excellent, good, fair, and poor, respectively, as per modified Klemm and Borner scoring criteria (Table 2).

DISCUSSION

Conventionally, antibiotic-mixed PMMA nail was used to control infection, and subsequent stabilization with ILIMN is to achieve union. After union, most often that nail requires removal also. The treatment method of this study thus avoids two operations for the same purpose. Apart from morbidity and mortality, economic issue is a concern. Although cumbersome Ilizarov distraction technique is a good option particularly with quiescent infection. Same is
also applicable for the exchange nail technique.\textsuperscript{13,14} We had to follow corticotomy and distraction histogenesis in one case and adopted exchange nailing technique in another case. Hence, those options are always applicable in any stage where indicated.

Combined application of vancomycin with gentamycin or tobramycin has been used by many authors with convincing results.\textsuperscript{5,15-17} Whereas Vatia \textit{et al.} (2017) used vancomycin and teicoplanin combination with good clinical outcome.\textsuperscript{13} In this study, vancomycin is used only as in 21 of 23 cases organisms, were sensitive to it. It worked also in those two cases where no organism can be isolated. Longer duration of antibiotic-mixed PMMA nail is not of much problem in terms of tissue response; moreover, it is evident that it can elude antibiotics as long as 5 years though in low quantity but above MIC level.\textsuperscript{18,22}

In the present series, infection developed in 14 cases of close fractures and 9 cases with open fractures. All were treated initially with interlocking intramedullary nail mostly using closed technique. More problems are faced to control infection and to achieve union in open fracture group. Possible reason may be deep intramedullary infection combined with bone surface and soft-tissue infection associated with some bone loss and some local vascular compriomisation.\textsuperscript{4} It appears that the use of “self-releasing antibiotic fixation endomedulary nail(SAFE nail)” application as initial treatment may be thought of. This is a dual core, multiple perforated intra medullary nail with locking facility. There is in built antibiotic impregnated cement inside where antibiotics are permitted to elude through the perforations.\textsuperscript{23} Additional procedures such as extraosseous debridement, application of cement beads, and bone grafting are relatively simple procedures with low morbidity.

Natarajan \textit{et al.}\textsuperscript{24} and Yang \textit{et al.}\textsuperscript{25} found that average union time is 24.9 weeks and 22.6 weeks, respectively. In the present study, the average union time is 13.3 weeks which is much faster than other techniques. Possible reasons are (1) as there is no locking compression is permitted at non-union site, (2) partial weight bearing with PTB cast stimulates union, (3) reaming improves vascularity at target site, and (4) reamed material acts as bone graft. To ensure the last one, we did not wash after last reaming. PMMA nail do not produce stable fixation. However, PTB cast supplements stability, fracture stability, and early weight-bearing hastens union.

Klemm and Borner assessment system included union time, range of motions of knees and ankle, wasting of muscles of leg, pain at fracture site, and alignment.\textsuperscript{12} Infection control is not a criterion in it. This is more applicable in non-infected situations. We have modified it by allowing 3 points for different states of infection in place of wasting of leg muscles. In all patients, we found wasting at presentation, persists during treatment. However, at 1-year follow-up, all improved to the presentation state and 5 cases achieved similar girth like that of the sound side.

2-3 months application of PTB is likely to develop stiffness of ankle. We did not see it in the present study. Itching sensation was experienced by all patients but could manage to continue.

During removal of PMMA nail of the first case, we faced a lot of difficulties and continued in other two cases also. This was because of early application of PMMA nail during hot stage. Subsequently, putting them after complete cooling, there is no such problem in remaining cases.

**CONCLUSION**

In active intramedullary infection with non-union following intramedullary nailing of tibial shaft fracture, antibiotic-mixed PMMA-impregnated nail use is the best option and is to be put in after complete polymerization. Continuing the same nail till union and augmented with PTB cast will significantly reduce the union time without causing much problem to the ankle joint. Although inconvenience of plaster application is a concern for a small subset of patients.

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How to cite this article: Bera AK, Roy AN, Pal JN, Das S, Bhakat U, Bari W. Can Antibiotic-mixed Polymethyl Methacrylate-wrapped Intramedullary Nail be used for Post Nailing Infected Tibial Non-union as Definitive Treatment? Int J Sci Stud 2017;5(5):121-125.

Source of Support: Nil, Conflict of Interest: None declared.
Introduction: It was Nyhus and Stoppa who spread a new light in the management of inguinal hernia by showing to the world the appropriateness of preperitoneal repair. Although the laparoscopic approach which came as a ramification of preperitoneal approach is getting popular, Lichtenstein’s anterior approach is still the widely done open surgical method even for recurrent inguinal hernia. In case of recurrent inguinal hernia with the previous anterior approach, resurgery with anterior approach may prove difficult due to dense scar tissue and lead to complications. In such cases, the open preperitoneal approach may prove to be a safe and better alternative.

Aim: This study is done to empirically verify the efficacy of open preperitoneal approach in the recurrent inguinal hernia.

Materials and Methods: A comparative study was done between 15 cases of anterior approach and 15 cases of preperitoneal approach for recurrent inguinal hernia in Government Rajaji Hospital, Madurai. Following parameters including duration of procedure, acute and chronic pain, Preoperative complications, post-operative complications including seroma, hematoma, testicular atrophy, and duration of stay were compared. Results were submitted for statistical analysis and conclusions drawn.

Results: Open preperitoneal approach is better than anterior approach in terms of duration of procedure, acute and chronic pain, and duration of stay, whereas no significant differences were made out with respect to per operative complications and post-operative complications including seroma, hematoma, and testicular atrophy. Open preperitoneal approach should be considered a valid option in the management of recurrent inguinal hernias.

Conclusion: Open preperitoneal approach is better than anterior approach in terms of duration of procedure, acute and chronic pain, and duration of stay. There is no difference between anterior approach and preperitoneal approach with respect to per operative complications and post-operative complications.

Key words: Acute pain, Anterior approach, Chronic pain, Hematoma, Nyhus, Preperitoneal, Preperitoneal approach, Recurrent inguinal hernia, Seroma, Testicular atrophy

INTRODUCTION

Inguinal hernia is one of the cornerstones of a general surgery practice. The treatment of inguinal hernia is integral to the history and current status of general surgery. Despite the frequency of the procedure, no surgeon has ideal results and complications such as post-operative pain, nerve injury, infection, and recurrence continue to challenge surgeons. Hence, there has been an evolution in different approaches for hernia treatment. The most significant advances to impact inguinal hernia repair have been the addition of prosthetic materials to conventional repairs and the introduction of laparoscopy. Lichtenstein tension-free mesh repair (anterior approach) is still the most widely done hernia surgery in India. However, in case of recurrent inguinal hernias, anterior approach is difficult due to fibrous tissue, distorted tissue plains, and anatomy. The advantage in the preperitoneal approach is that the hernia can be approached through a virgin tissue plane without fibrous tissue and the prosthesis can be placed between hernia contents and hernia defect. The strength of the transversalis fascia is reinforced by addition of prosthesis deep to it. Laparoscopic hernia repair which approaches
the hernia through a preperitoneal approach is increasingly becoming popular, but it has the disadvantage of having a long learning curve, where dissection becomes demanding in case of large hernias and also high cost associated with the procedure. Transinguinal open preperitoneal approach avoids all the above disadvantages while retaining the advantages of preperitoneal mesh repair.

**Aim**

This study is done to empirically verify the efficacy of open preperitoneal approach in recurrent inguinal hernia.

**MATERIALS AND METHODS**

This comparative study was conducted in the Department of General Surgery in Government Rajaji Hospital, Madurai, on the management of recurrent inguinal hernias. A total of 30 cases of recurrent inguinal hernia were included in the study. Patients were allotted for either anterior approach or preperitoneal approach of surgery randomly. Inclusion criteria: Diagnosis of uncomplicated recurrent inguinal hernia, recurrent inguinal hernia with the previous hernioplasty, age >13 years, fit for surgery, and non-diabetic patients were included in the study. Exclusion criteria: Cases or recurrent inguinal hernia with primary inguinal hernia, recurrent inguinal hernia with previous herniorrhaphy, other hernias of anterior abdominal wall, previous preperitoneal/laparoscopic hernia repair, unfit for anesthesia (cardiac disease and chronic obstructive pulmonary disease), unwilling candidates who were reluctant to oblige for the study, complicated hernia (non-reducible, incarcerated inguinal hernia, and strangulated hernia), diabetic and immunosuppressed patients, and patients who have undergone prior pelvic lymph node resection or groin irradiation or open prostatectomy were excluded from the study. The data collected by clinical history and physical examination. All patients underwent routine laboratory investigations and special investigations (ultrasound).

**RESULTS**

Thirty patients were underwent procedure, 15 in each group. Age distribution among those who underwent anterior approach and preperitoneal approach was almost equal (Table 1).

The duration of procedure was significantly low in preperitoneal group with 12 surgeries taking 40-50 min for complete procedure. In case of anterior group, none of the surgeries was completed within 50 min, and 6 surgeries took more than 60 min for complete procedure. The mean duration of procedure for preperitoneal approach was 48.6 min compared to anterior approach which was 60.47 min with a statistically significant at \( P < 0.0001 \) (Table 2).

Acute pain recorded by visual pain analog scale on the 2nd post-operative day (POD) for preperitoneal approach ranged from 20 to 42 mm with a mean of 31.7 mm. Seven patients had pain <30 mm, and only two patients had pain more than 40 mm. Acute pain in anterior approach group ranged from 30 to 48 mm with a mean of 40.7 mm. Only two patients in the anterior group had pain <30 mm. The difference was statistically significant at \( P = 0.001 \) (Table 3).

Two patients in preperitoneal approach group had chronic pain compared to four patients in anterior approach group. However, the difference was not statistically significant at \( P = 0.955 \) (Table 4).

---

**Table 1: Age distribution**

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Anterior approach</th>
<th>Preperitoneal approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>41-50</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>51-60</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>61-70</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>&gt;70</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>57.1±9.22</td>
<td>58.3±11.06</td>
</tr>
<tr>
<td>( P ) value</td>
<td>0.749</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Duration of procedure**

<table>
<thead>
<tr>
<th>Duration of procedure (min)</th>
<th>Anterior</th>
<th>Preperitoneal</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>&gt;60</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>60.47±8.19</td>
<td>48.6±6.57</td>
</tr>
<tr>
<td>( P ) value</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Acute pain (mm)**

<table>
<thead>
<tr>
<th>Acute post-operative pain (2ND POD)</th>
<th>Anterior</th>
<th>Preperitoneal</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>31-40</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>41-50</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>40.4±5.62</td>
<td>31.67±7.34</td>
</tr>
<tr>
<td>( P ) value</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Chronic pain (>30 days)**

<table>
<thead>
<tr>
<th>Chronic pain (&gt;30 days)</th>
<th>Anterior</th>
<th>Preperitoneal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>( P ) value</td>
<td>0.955</td>
<td></td>
</tr>
</tbody>
</table>
One case in preperitoneal approach and one case in anterior approach had an incidence of hematoma in immediate post-operative period (Table 5). There are no pre-operative complications in both groups.

One case had an incidence of seroma in preperitoneal group, whereas three cases had an incidence of seroma in anterior group. However, the difference was not statistically significant (Table 6).

Table 7 shows that the testicular atrophy mean duration of stay for preperitoneal group was 4.06 days compared to anterior approach group with 5.47 days with a statistically significant at $P = 0.004$ (Table 7). There was no evidence of testicular atrophy in both anterior and preperitoneal groups.

**DISCUSSION**

Recurrent inguinal hernia occurs mainly due to pre-operative patient status such as cough and benign prostatic hyperplasia, defective collagen biology, poor surgical technique, and post-operative causes such as wound infection. In words of Schumpelick et al., “whereas recurrent and incisional hernias following suture repair are most likely caused by a defective biology, nevertheless, the recurrence following mesh repair may be regarded as a technical fault, at least in theory.” Whatever be the cause of recurrence, surgical technique and methodology are very important in the surgical management of recurrent inguinal hernia. In this study comparing methodology, anterior approach and preperitoneal approach for recurrent inguinal hernia were compared. The results when compared with the previous published studies show similarities in many aspects and differ in some aspects. As old age is one of the factors causing increased surgical complications in inguinal hernia surgery, the age difference in the two groups was submitted for statistical analysis and found to be not significant. The mean age between the two groups proved to be almost equal. The mean duration of surgery for preperitoneal approach was 48.6 min when compared with the study of Karatepe et al. with 44.56 min. Saber et al. in their studies, showed preperitoneal approach to have less operative duration compared to anterior approach (71.6 vs. 94.7 min). These values, when compared with the mean duration of surgery for anterior approach in our study (60.47 min), show preperitoneal approach to be better than anterior approach in terms of duration of procedure. No pre-operative complications such as vessel injury, bowel injury, and bladder injury were recorded in our study. However, Ray et al. report one case (2.7%) of vessel injury during preperitoneal approach in their studies. Karatepe et al. and Kurzer et al. reported no cases of pre-operative complications during preperitoneal approach in their studies. From these observations, it can be safely concluded that preperitoneal approach is safe in terms of pre-operative complications. Pain recorded on second POD by visual analog scale was taken as acute pain in our study. Acute pain was significantly lower in preperitoneal group compared to anterior approach group (mean 31.7 vs. 40.4 mm). Willaert et al. also reported similar conclusion in their meta-analysis. Preperitoneal approach is similar to anterior approach in terms of reducing post-operative acute pain. Pain recorded after 30th POD by visual analog scale was taken as chronic pain in our study. Four patients in anterior approach group and two patients in preperitoneal group showed chronic pain in our study, but the difference was statistically insignificant. Li et al. in their study, came to similar conclusion. However, this conclusion differed from many previous studies reporting gross difference in chronic pain with reduced pain reported in preperitoneal approach. These studies include Koning et al., Ray et al., Saber et al., and Willaert et al. This study failed to demonstrate the statistically significant difference in terms of chronic pain between anterior and preperitoneal group. No statistically significant difference was made out between anterior and preperitoneal group with respect to hematoma, seroma, and testicular atrophy, though there was more incidence of seroma in anterior group (3 cases vs. 1 case). Except Saber et al. who reported 5 cases of testicular atrophy in anterior approach group, several other studies including Ray et al., Li et al., and Karatepe et al. came to similar conclusions. Like Farooq et al. and Kurzer et al., this study reports preperitoneal approach to be safe in terms of post-operative complications. Duration of stay was significantly low in preperitoneal group compared to anterior approach group (4.06 vs. 5.47 days). The mean
duration of stay for preperitoneal group was reported to be 1.6 days by Karatepe et al., 6 4.6 days by Ray et al., 9 1.2 days by Saber et al., 8 and Saber et al. 8 report low hospital stay duration in preperitoneal group (1.6 vs. 4.7 days). This study reports preperitoneal approach to be better in terms of duration of stay.

**CONCLUSION**

Open preperitoneal approach is better than anterior approach in terms of duration of procedure, acute and chronic pain, and duration of stay. No significant differences were made out between anterior approach and preperitoneal approach with respect to per operative complications and post-operative complications including seroma, hematoma, and testicular atrophy. Open preperitoneal is safe in terms of having no pre-operative complications and low post-operative complications. Open preperitoneal approach should be considered a valid option in the management of recurrent inguinal hernias.

**REFERENCES**


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Role of Multidetector Computed Tomography in Bowel Obstruction

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INTRODUCTION

Intestinal obstruction accounts for 20% of surgical admissions of patients with acute abdomen. The early diagnosis of bowel obstruction is critical in preventing complications, particularly perforation and ischemia.¹

The morbidity and mortality associated with acute small-bowel obstruction is significant. It accounts for 12-16% of all surgical admissions in patients with acute abdominal conditions. Post-operative adhesions account for 70% cases of small-bowel obstruction. Other common causes include hernias, neoplasms, and Crohn’s disease.² Mechanical large bowel obstruction is 4-5 times less common than small bowel obstruction, most common cause being neoplasm.³

Plain films are usually obtained initially and have overall 69%, 57%, and 67% sensitivity, specificity, and accuracy, respectively.⁴ Its accuracy in diagnosing the site and cause of obstruction and the presence of strangulation is even lower. A gastrointestinal contrast study may be indicated when a low-grade partial bowel obstruction is suspected. Small-bowel follow-through was traditionally performed and has been largely replaced by enteroclysis with the nasoenteric tube, advanced beyond the duodenojejunal junction. It has high performance in depicting and demonstrating the level and cause of obstruction, even in lower grades of bowel obstruction and multifocal incomplete obstructions. However, enteroclysis is contraindicated in patients with acute and complete or high-grade bowel obstruction and those with strangulation or suspected perforation. Its use should also be avoided in patients with markedly diminished
intestinal peristalsis. The clinical usefulness of magnetic resonance imaging in this field is still limited; however, favorable results have been reported.\textsuperscript{5}

Given the relative lack of sensitivity and specificity of plain film findings in patients with symptoms of bowel obstruction, in acute settings, and computed tomography (CT) plays a central role in evaluation.

**MATERIALS AND METHODS**

This is a hospital-based cross-sectional study (observational study) done on 53 patients, suspected to have intestinal obstruction referred for CT scan of the abdomen to the Department of Radio Diagnosis at Saifee Hospital, Mumbai. The study period was 2 years (July 2013-June 2015). Initially, written informed consent was obtained from all patients. Thereafter, the individual details, clinical history, and history if any were recorded.

**Procedure**

Study was conducted on Phillips Brilliance 40 slice CT with collimation 40 × 0.625 mm, slice thickness 0.6 mm and 40 slices per rotation. Plain scans were obtained before giving positive oral contrast (trazogastro, containing diatriazoatemeglumine, and diatriazoate sodium in aqueous base). Oral contrast was avoided if bowel is already distended with intraluminal fluid or if patient cannot tolerate it. Rectal contrast is given if large bowel pathology is suspected. Intravenous contrast (injection contrapaque or omnipaque [350 mg/ml]) was injected using dual head CT pressure injector and triphasic-contrast study was carried out. Thin 1 mm reconstructions were obtained to study axial, coronal, and sagittal reformatted images on workstation. DICOM images were saved in CD format for future reference. Surgical, histopatholgical, clinical, and other relevant follow-ups were obtained if available.

**Statistical Analysis**

Descriptive statistics were reported using mean and standard deviations for continuous variables, number and percentages for categorical variables. Cross tabulation was done for all the variables of interest. McNemar’s Chi-square test was done to test the significance of proportions of CT with surgical findings. Sensitivity, specificity, positive, and negative predictive values were computed. \( P < 5\% \) were considered statistically significant. All the analyses were performed using SPSS software.

**RESULTS**

This study comprised of 53 cases with suspicion of intestinal obstruction. The age group of patients ranged from 1 to 83 years with a mean of 49.2 years. Out of 53 cases, 26 were males (49.06\%), and 27 were females (50.94\%). Abdominal distention and inability to pass stools were most common symptoms in the study (Table 1).

Out of 53 cases studied, 30 cases were given positive oral contrast and almost all the patients were given intravenous contrast except one patient, in which contrast study was not required and only plain study was sufficient to provide required information.

The “small bowel feces sign” and the “CT string of beads sign” were found in 3/53 and 2/53 patients, respectively, and were always present with presence of intestinal obstruction.

Out of 53 cases studied, 43 were diagnosed as presence of intestinal obstruction on CT with 69.8\% having small bowel obstruction, 11.32\% having large bowel obstruction and level was not identified in 18.87\% case. Adhesion/band was most common cause on CT (27.9\%). Other common causes being primary bowel tumor (11.63\%), hernia (6.98\%), intussusceptions (4.65\%), and volvulus (4.65\%) (Table 2).

On follow-up, 64.15\% cases were managed surgically, 26.42\% were managed conservatively and follow-up of 5 cases (9.43\%) was lost. Out of remaining 48 cases final diagnosis of intestinal obstruction was present in 37/48 patients (77.08\%) with final level of obstruction being small bowel in 29/48 cases and large bowel in 6/48 case. Final diagnosis of both small and large bowel obstruction was found in 2 cases. Out of 48 cases with follow-up, final most common cause of intestinal obstruction was found to be adhesion/band (22.92\%). Other common causes were volvulus (8.33\%), primary

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Number of patients=53 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal distension</td>
<td>40 (75.47)</td>
</tr>
<tr>
<td>Constipation</td>
<td>39 (73.58)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>29 (54.72)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>30 (56.60)</td>
</tr>
<tr>
<td>Others</td>
<td>20 (37.74)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of obstruction on MDCT</th>
<th>Number of patients=53 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small bowel</td>
<td>37 (69.81)</td>
</tr>
<tr>
<td>Large bowel</td>
<td>6 (11.32)</td>
</tr>
<tr>
<td>Not applicable</td>
<td>10 (18.87)</td>
</tr>
<tr>
<td>Total</td>
<td>53 (100.00)</td>
</tr>
</tbody>
</table>

CT: Computed tomography, MDCT: Multidetector computed tomography
bowel tumor (6.25%), hernia (6.25%), and intussusceptions (6.25%) (Table 3).

Overall performance of CT in diagnosis of intestinal obstruction consisted of 75% true positive cases, 14.58% true negative cases, 8.33% false positive cases, and 2.08% cases of false negative. Thus, on statistical analysis (McNemar's Chi-square test) CT was found to be 97.29% sensitive and 63.63% specific in diagnosis of intestinal obstruction (Table 4).

Out of total 37 cases, with final diagnosis as intestinal obstruction, CT could identify correctly the cause of 70.27% case and was incorrect in identifying the causes of 29.73% cases. CT was found to be correct in identifying the level of 89.19% cases and incorrect in identifying level of 10.81% cases.

**DISCUSSION**

In the study by Markogiannakis *et al.*, 6 of the 150 patients with small and large bowel obstruction, 121/150 (80.6%) presented with inability to pass stools, 118/150 (78.6%) presented with vomiting, 98/150 (65.3%) with abdominal distension and 111/150 (74%) presented with abdominal pain.

In our study, of the 53 patients, 40 patients (75.4%) had abdominal distension, 39 patients (73.5%) had constipation, 29 patients (54.7%) had vomiting, and 30 patients (56.6%) presented with abdominal pain. Abdominal distension was found to be most frequent clinical feature in our study; however, in the study by Markogiannakis *et al.*, 6 inability to pass stools was most common clinical feature.

The “small bowel feces sign” and the “CT string of beads sign” were found in 3/53 and 2/53 patients, respectively, and were always present with presence of intestinal obstruction.

Lazarus *et al.* 7 found that the “small bowel feces sign” was present in 19/34 patients (55.9%) with small bowel obstruction in their study and Catalano 8 found that was present in 7.4% of 94 patients with small bowel obstruction.

In our study, this sign was seen in two out total 53 patients (3.7%), no studies in literature have evaluated this sign for diagnosing obstruction, although this sign has been described for small bowel obstruction. 9

In our study, adhesion/band was most common cause on CT (27.9%). In the study by Megibow *et al.*, 10 where both large and small bowel obstructions were considered together, out of 64 patients with confirmed obstruction, adhesion was the most common cause of obstruction (37 cases, i.e., 57.8%), followed by primary tumor (7 cases), metastasis (6 cases), Crohn’s disease (4 cases), hernia (3 cases), hematoma and diverticular disease (2 cases each) and one case each of gall stone ileus, intussusception, and appendicitis causing obstruction.

In our study, CT was found to be 97.29% sensitive and 63.63% specific in diagnosis of intestinal obstruction. The overall sensitivity and specificity of CT for diagnosis of both small and large bowel obstruction in our study is different when compared to the results obtained by Megibow *et al.* 10 Our results show more sensitivity and less specificity. Our study had four false positives and one false negative.

In our study, CT was able to identify correctly the cause of 70.27% case and was incorrect in identifying the causes of 29.73% cases. In the study done by Maglinte *et al.* 11 CT correctly showed the cause of obstruction in 95% of the cases (39/41). The two cases which proved wrong on CT were Crohn’s disease and radiation enteritis.

**CONCLUSION**

CT has become the most important non-invasive imaging tool to diagnose small and large bowel diseases as it has the potential to provide significant information which leads to

### Table 3: Distribution of the participants according to the cause of obstruction on CT

<table>
<thead>
<tr>
<th>Cause on CT</th>
<th>Number of patients=53 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary bowel tumor</td>
<td>5 (11.63)</td>
</tr>
<tr>
<td>Hernia</td>
<td>3 (6.98)</td>
</tr>
<tr>
<td>Adhesions/band</td>
<td>12 (27.91)</td>
</tr>
<tr>
<td>Intussusception</td>
<td>2 (4.65)</td>
</tr>
<tr>
<td>Malrotation</td>
<td>2 (4.65)</td>
</tr>
<tr>
<td>Volvulus</td>
<td>2 (4.65)</td>
</tr>
<tr>
<td>Tumor recurrence</td>
<td>1 (2.33)</td>
</tr>
<tr>
<td>Extrinsic cause</td>
<td>3 (6.98)</td>
</tr>
<tr>
<td>Inflammatory cause</td>
<td>4 (9.30)</td>
</tr>
<tr>
<td>Foreign body</td>
<td>2 (4.65)</td>
</tr>
<tr>
<td>Not identified</td>
<td>7 (16.28)</td>
</tr>
<tr>
<td>Total</td>
<td>43 (100.00)</td>
</tr>
</tbody>
</table>

CT: Computed tomography

### Table 4: Performance of CT in diagnosis of intestinal obstruction

<table>
<thead>
<tr>
<th>CT performance in diagnosing intestinal obstruction</th>
<th>Frequency n=53 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>True positive</td>
<td>36 (75.00)</td>
</tr>
<tr>
<td>True negative</td>
<td>7 (14.58)</td>
</tr>
<tr>
<td>False positive</td>
<td>4 (8.33)</td>
</tr>
<tr>
<td>False negative</td>
<td>1 (2.08)</td>
</tr>
<tr>
<td>Total</td>
<td>48 (100.00)</td>
</tr>
</tbody>
</table>

CT: Computed tomography
timely appropriate treatment and thus positively affect the outcome, morbidity, and mortality of patients.

**REFERENCES**


**How to cite this article:** Singhania KV, Mehta R. Role of Multidetector Computed Tomography in Bowel Obstruction. Int J Sci Stud 2017;5(5):130-133.

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Study of Vitamin D Deficiency in Urban Population of Kolhan, Jharkhand

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Caucasian.¹-³ Thus for Indian skin tone, minimum “direct sun exposure” required daily more than 45 min to bare face, arm and legs to sun rays (wavelength 290-310 mm). With the exception of those who perforce need to work outdoors in the sun, most of Indians do not get adequate sun exposure to produce sufficient amount of Vitamin D endogenously. Indian social and/or religious norms related to public modesty dictate that most parts of an individual's body irrespective of gender, be covered. Due to urbanization in big cities, a majority of people live in very high population density areas. They perforce to live in overcrowded tenements, which are closely packed and 3-4 stories high. Consequently direct sunlight not reach inside most parts of dwelling thereby disallowing any sun exposure to individuals. In addition, lack of space offers limited options for outdoor activities.

A women’s lifestyle depends on several daily life activities, such as nutrition and dietary habits, sunscreen application Vitamin D intake and physical activity. A desirable lifestyle

Abstract

Introduction: Vitamin D deficiency is pandemic; yet, it is the most under diagnosed and under treated nutritional deficiency in the world. Vitamin D deficiency is wide spread in individuals irrespective of their age, gender, race, and geography.

Aim: The aim of the study was to study serum Vitamin D level among the urban population of Jharkhand and to determine the correlation between Vitamin D and selected variable of interest such as age, sex habitation with reference to diet, and social habits.

Materials and Methods: A cross-sectional study was conducted in the Department of Physiology, Mahatma Gandhi Memorial (MGM) Medical College, Jamshedpur (sample collected from the attended of Outpatient Department of MGM Medical College, Jamshedpur).

Results: The majority of the participant (84.61% had Vitamin D deficiency). In our results, the prevalence of Vitamin D deficiency increases with age and more common in female than male.

Conclusion: There is a high prevalence of Vitamin D deficiency in the population of Kolhan area of Jharkhand not only in female but also in male population.

Key words: Correction, Urban population, Vitamin D deficiency

INTRODUCTION

Vitamin D deficiency is a major health problem across all age group in India and has assumed epidemic proportions despite India being a tropical country with adequate exposure of sunlight to an individual’s “bare skin” required to photo synthesize Vitamin D is grossly ill understood. Darker skin has high melanin content which acts as a natural sunscreen. Therefore, darker skin produces a significance lesser amount of Vitamin D when compared with the individuals with fairer skin, such as Caucasian.¹-³ Thus for Indian skin tone, minimum “direct sun exposure” required daily more than 45 min to bare face, arm and legs to sun rays (wavelength 290-310 mm). With the exception of those who perforce need to work outdoors in the sun, most of Indians do not get adequate sun exposure to produce sufficient amount of Vitamin D endogenously. Indian social and/or religious norms related to public modesty dictate that most parts of an individual's body irrespective of gender, be covered. Due to urbanization in big cities, a majority of people live in very high population density areas. They perforce to live in overcrowded tenements, which are closely packed and 3-4 stories high. Consequently direct sunlight not reach inside most parts of dwelling thereby disallowing any sun exposure to individuals. In addition, lack of space offers limited options for outdoor activities.

A women’s lifestyle depends on several daily life activities, such as nutrition and dietary habits, sunscreen application Vitamin D intake and physical activity. A desirable lifestyle
contribute to levels of Vitamin D within the normal range, while a lifestyle avoiding sunlight and low Vitamin D intake has adverse effect on their health.4,5

Vitamin D acts as a hormone. It stimulates intestinal calcium absorption and is important in maintaining adequate phosphate levels for bone mineralization, bone growth, and remodeling. It is also believed to be involved in the regulation of cell growth proliferation and apoptosis, as well as modulation of the immune system and other tensions. Alone or in combination with calcium Vitamin D has also been shown to reduce the risk of fracture in elderly men (>65 years) postmenopausal women and risk of falls in community dwelling seniors.

Definition of optimum levels of Vitamin D for maintenance of bone health has been a matter of debate. However, the evolving consensus is to define Vitamin D deficiency as a serum 25-hydroxyvitamin D level of <20 ng/ml (<50 nmol/L) insufficiency, 20-30 ng/ml (50-75 nmol/L) sufficiency >30 ng/ml (>75 nmol/L), and intoxication 150 ng/ml (>374 nmol/L).6

**MATERIALS AND METHODS**

Total 182 people of age group 18-70 years were included in this study, who came as attendant along with patient in different Department of Mahatma Gandhi Memorial Medical College Jamshedpur. It was a cross-sectional study conducted during March 2016-2017. After taking consent, a questionnaire was filled which includes age, physical activity level, duration of sun exposure, body parts exposed to sunlight, use of sun screen, dietary intake of Vitamin D, and intake of supplements. After taking aseptic measure 2 ml of blood sample collected and sent to laboratory for Vitamin D3 assessment. Plasma levels were categorized into three cutoffs: When serum 25-hydroxyvitamin D (25(OH)D) levels were <20 ng/L - Vitamin D deficiency, when levels were 20-30 ng/ml - insufficiency and when levels, was >30 mg/ml - sufficiency.

Subject excluded from the study having any current or previous chronic diseases, history of Vitamin D deficiency, thyroid, parathyroid diseases, renal disease history of metabolic bone diseases, history of malabsorption syndrome, and chronic diarrhea.

**RESULTS**

Out of 182 study subject, 110 (60.4%) were female and 72 (39.5%) male. Status of Vitamin D revealed in Tables 1 and 2 and Charts 1 and 2. Difference in the level of Vitamin D between female and male in the urban area of Kolhan Jharkhand found to be statistically significant. The study also showed relation between sunlight exposure and Vitamin D status of participant. Although it was not statistically significant Table 3.
DISCUSSION

The present study points toward a high prevalence of Vitamin D deficiency in an urban population of Kolhan, Jharkhand. A total of 182 subjects, 97 (88.18%) female and 57 (79.1%) male were found Vitamin D deficient. This is despite the fact that this region gets a good sunshine throughout the year and the people are well off and can afford good nourishment. Most of the study conducted on other Indian population show a similar picture of deficient Vitamin D status. Many authors suggested a revision of nutritional guide line and even a national level fortified food scheme to improve scenario.

Female population had significantly higher prevalence of deficient Vitamin D levels compared to their male counterpart. However, this difference dissipates higher cut off levels, such that none of two groups fare better. Our study showed that only few women applied sun screen to protect their skin, this is not consistent with a study conducted in Australia by Wolpowitz et al. High percentage of these women apply sun screen to protect them from skin cancer. Ultimately the recommendation for the avoidance of sun exposure has put the world population at risk of Vitamin D efficiency.

Prevalence of Vitamin D deficiency was significantly different across various age groups. Middle age group (41-60 years) displayed relatively lower prevalence compared to their younger (40 years and less) as well as older (61 years and more) counterpart. Elderly people are known to be prone to Vitamin D deficiency. Decrease exposure to sun light, reduced cutaneous synthesis of Vitamin D, and dietary inadequacy could be the factors contributing to lower Vitamin D level in the elderly. Younger age group (40 years and less), our study circle, consisted mainly of employed person with long indoor working hours and less duration of exposure to sunlight. This group is also likely to eat irregularly and junk food, these factors could translate into lower Vitamin D levels.

The Food and Agriculture Organization /Worlds Health Organization expert consultation state that most physiological relevant and efficient way of acquiring Vitamin D, in most location of the world around the equator (between latitude 42° N and 42° S) is to synthesize Vitamin D endogenously from skin from 7-de-hydrocholesterol present in the subcutaneous fat by minimum of 30 min of skin exposure (without sunscreen) of the arm and face to mid-day sun. Our study shows that out of 182 participants who has no exposure of sun light 42.30% deficient, 9.8% insufficient. Those who expose up to 30 min 20.8% deficient, 13.1% insufficient and those who exposed up to 1 h 0.5% deficient, and 8.2% insufficient. Educational background of the subject does not seem to have effects of Vitamin D level. However, occupation affects Vitamin D level. None of those serving as public servant or pursuing various profession and business had the optimal level. Subject who reported to be a labor or house wife, or unemployed showed a significant optimal level. This probably suggests more staying duration and lesser sun light exposure to the service holder or professional.

The institute of medicine recommended 200 IU/day of Vitamin D for the adults younger than 51 years, 400 IU/day 51-70 years, and 600 IU/day for those older than 70 years. Us Food and Drug Administration recommends 400 IU/day (10 µg/day) regardless of age. Few foods naturally contain Vitamin D like oily fish such as salmon (400 IU/35 Oz) and mackerel and cod liver oil (400 IU/TSF). Egg yolk also contains Vitamin D approximately 20 IU, but more commonly consumed food such as milk and butter egg give <100 IU. This study points toward inadequate dietary intake in the form of dairy product and vegetables in large group of population.

CONCLUSION

The current study found that Vitamin D deficiency and insufficiency were common among studied population. Deficiency was more in those who were exposed less to sunlight. Health education about sunlight and Vitamin D supplementation is necessary to prevent Vitamin D deficiency. Low calcium intake in consumption with Vitamin D deficiency makes matter worst. The need for
improvement in Vitamin D status is important and urgent in Jharkhand. The health planner needs to take substantive measures in this direction.

ACKNOWLEDGMENT

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Role of Non-contrast Computed Tomography - Kidney, Ureter, and Bladder in Predicting the Stone Fragility and Extracorporeal Shock Wave Lithotripsy Success Rate

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Abstract

Introduction: Extracorporeal shock wave lithotripsy (ESWL) has revolutionized the treatment strategy of urolithiasis worldwide and continues to be a major therapeutic modality for treating a majority of upper urinary tract stones.

Aim: The aim is to study the density of renal stone by non-contrast computed tomography (NCCT) scan as measured in Hounsfield unit (HU) and its correlation with susceptibility of fragmentation by ESWL.

Materials and Methods: This is a prospective study conducted in 100 patients of renal stone disease who underwent ESWL treatment at Tirunelveli Medical College Hospital, during January 2016 to March 2107 were included in the study.

Results: The overall success rate of ESWL was 80% in our study. 68/100 patients with <750 HU had 100% stone fragmentation and clearance. 12/100 patients with 750-100 HU had 59% stone fragmentation and clearance in the II sitting and 41% had stone fragmentation and clearance in III sitting (retreatment with ESWL needed). 20/100 patients with HU >1000 had significant residual fragment even after III sitting ESWL (auxiliary procedures needed) (there was a statistically significant difference with P < 0.001).

Conclusion: For stones with HU >1000, other modalities of treatment (endoscopic and open stone surgery) are preferable to ESWL. NCCT estimation of stone density by HU predicts the successful outcome of the ESWL therapy.

Key words: Extracorporeal shock wave lithotripsy, Hounsfield unit, Non-contrast computed tomography, Renal stones

INTRODUCTION

Stone disease causes enormous social and economic burden to the society.¹ The lifetime prevalence of kidney stone disease is 1-15% with the probability of having a stone varying according to age, gender, race, and geographic location. Management options for renal calculi has changed dramatically during the past 30 years.² Minimally invasive techniques, especially the introduction and development of extracorporeal shock wave lithotripsy (ESWL) have virtually replaced open surgical stone removal.³ ESWL was introduced by Chaussy et al. in 1980.⁴ Around 80-85% of simple renal calculi can be treated effectively with ESWL. ESWL is a non-invasive therapy for urinary calculi with good success rates and decreased morbidity, length of hospitalization, and anesthesia requirement.⁵ According to the AUA guidelines, ESWL is the preferred modality of treatment for renal stones of 2 cm size. Even large and complex renal calculi can be treated effectively with these minimally invasive techniques. For complete staghorn calculi a combined percutaneous nephrostolithotomy (PCNL) and ESWL (Sandwich) therapy has been recommended as the
first line of treatment. However, even for the calculi of this size, the stone-free rates (SFRs) vary between 66% and 99%. This variation in stone fragmentation is due to factors such as stone size, location, chemical composition, body mass index, other congenital anatomical anomalies, shock wave generator, and presence of obstruction (or) infection. The renal calyces are the most common location of asymptomatic (or) incidentally discovered urinary calculi. Pelvic calculi, upper calyceal, and middle calyceal stones of <2 cm have been treated with ESWL with SFR of up to 99%. The management of lower calyceal stone is more controversial and in this situation, SFR after ESWL range from 44% to 79%. Lower calyceal stone with favorable infundibula pelvic anatomy have good success rate with ESWL. Stone fragmentation by ESWL is variable. Hence, it is desirable to reduce the number of retreatment (or) limit one definite therapy. In addition to the local effects of ESWL on renal parenchyma, injuries to surrounding organs are also of concern. The long-term prevalence rate of HT and change in renal plasma flow following ESWL treatment constitute a further reason for the surgeon to limit the therapy to one-stage definite treatment. The success of ESWL has been correlated with the radiodensity of the renal stone on plain X-ray kidney, ureter, and bladder (KUB). Overall accuracy of predicting calculi composition from plain radiographs was reported to be only 39%, which is at present insufficient for clinical use. The emergence of non-contrast computed tomography (NCCT) KUB in the assessment of flank pain and the subsequent availability of the attenuation coefficient measurement has resulted in many studies comparing the attenuation value and stone composition in vitro. These studies have determined that stone compositions can be predicted on the basis of the attenuation value determined by NCCT. The density of stone measured by NCCT Hounsfield unit (HU) varies with stone composition and determines the fragility of a calculi which ultimately determines the clinical outcome in ESWL. NCCT, because of its easy availability, superb sensitivity, and very high-resolution capability, is a good modality for the measurement of stone density.

**Aim**
The aim is to study the density of renal stone by NCCT scan as measured in HU and its correlation with susceptibility of fragmentation by ESWL.

**MATERIALS AND METHODS**

This is a prospective study conducted in 100 patients of renal stone disease who underwent ESWL treatment at Tirunelveli Medical College Hospital, Tirunelveli. Inclusion criteria: Patients with renal stones 8-35 mm in diameter who have not received any previous treatment for the same. All stones were located in a satisfactory functioning, non-obstructed renal unit. Exclusion criteria: Bleeding diathesis, pregnant females, uncontrolled infection, ureteric calculi, distal obstruction, congenital anomalies, patients with cardiac pacemaker, and lower calyceal stone with unfavorable anatomy. 100 patients with renal stones were included in the study. In all patients, history and physical examination were done. Baseline investigations included complete hemogram, renal function tests, urine C/S, X-ray KUB, ultrasonography (USG) KUB, and CT KUB. NCCT scan was done in 3 mm cuts. Stone density in HU was obtained on the particular cut in which the stone was seen in the greatest diameter. Mean stone density was calculated in some cases. Patients were explained about the study, ESWL procedure and informed consent were obtained. ESWL was done as outpatient procedure. Patients’ data were recorded in the pro forma. All treatments were done with Dornier Compact Delta III (Electromagnetic Generator) Machine. Patients were administered sedation intravenous Fortwin (20 mg), 30 min before procedure. In pediatric patients, endotracheal general anesthesia was given by anesthetist. Topical EMLA cream was used in some patients. Calculus was focused using fluoroscopy, USG probe (in radiolucent stones) a maximum of 2500 shocks were given in each sitting. Intensity of shockwaves increased stepwise. Shock frequency was 60/min. Stone fragmentation was monitored fluoroscopically after every 100 shock waves or continuously with USG probe, and the procedure was terminated once adequate fragmentation was observed. Adequate fragmentation was accepted when following were observed: Increase in stone surface area, alteration in configuration, irregularity in outline, obviously separated fragment, and decreased overall density. If the stone size is large (>2.5 cm), pre-procedure 5F DJ stenting was done. After each session of treatment, patients were observed for 4-6 h period and allowed to go home. Patients were explained about the post-treatment hematuria, pain and voiding of fragments. Analgesics were given and patients advised to take around 5-6 L of fluid/day. All patients were instructed to pass urine through sieve (coffee filter) and to collect stone fragments. This was brought and given to us at the time of review for chemical analysis. Patients were followed up at 2 weeks with X-ray KUB, USG KUB, and CT KUB. For those patients with residual fragments, II sitting ESWL was instituted. For those patients who underwent II session of ESWL, follow-up was done at the end of 4 weeks with X-ray KUB, USG KUB, and CT KUB. Those patients with residual fragments, III sitting ESWL was given. After 2 weeks, patients were followed up. Residual calculi by X-ray KUB, USG KUB, and CT KUB <4 mm clinically insignificant residual fragment were considered adequately treated. Residual fragments >4 mm were considered treatment failures.
RESULTS

This study comprised of 100 patients who had satisfied the inclusion and exclusion criteria mentioned earlier and later underwent NCCT KUB for the assessment of stone density in HU followed by ESWL (maximum III sittings 7500 shock waves).

There were 69 male patients and 31 female patients in the study. The age of the patients ranged from adults 97 patients (20-60 years) pediatric age group 3 patients. Majority of patients presented with loin pain (80 out of 100 patients). Other symptoms were dysuria, hematuria, and urinary tract infection. 20 patients were asymptomatic and incidentally detected (Table 1).

It was observed that 65 patients had right-sided stones and 35 patients had left-sided stone. The largest calculus was 35 mm and smallest was 8 mm. In our study, stone of size 8-15 mm were found in 70 patients (70%), 16-25 mm in 17 patients (17%), and 26-35 mm in 13 patients (13%) (Table 2).

58 patients had stone in the renal pelvis, 25 patients had stone in the upper calyx, 10 patients had stone in the middle calyx, and 7 patients had stone in the lower calyx with favorable anatomy (Table 3). Stone size >25 mm were stented, 30 patients were stented and 70 patients were non-stented.

Stone Density in CT Scan

- 68 patients had CT HU= 320-750
- 12 patients had CT HU =750-1000
- 20 patients had >1000 HU.

Out of 100 patients, 68 patients’ stone was completely disappeared. 12 patients had good fragmentation and 20 patients had clinically significant residual fragment.

In 68 patients, size of the stones are 58 patients 8-15 mm 16-25 mm in 6 patients, 4 patients had 26-35 mm, even though the size >2.5 cm if HU was <750, stone fragmentation rate was good (Table 4).

12 patients had stone density of 750-1000. Among the 12 patients, 7 patients underwent II sitting ESWL and stone was fragmented. 5 patients underwent III sitting ESWL and stone was completely fragmented. Among 12 patients, 6 patients had stone size 8-15 mm, 4 patients had stone size 16-25 mm, and 2 patients had stone size 26-35 mm. In the II group, re-treatment is needed. 7 patients residual fragments at 2 weeks and underwent II sitting ESWL, 5 patients underwent III sitting ESWL and became stone-free. 20 patients had stone density of >1000 HU and received 7500 shocks. III sitting ESWL patients had clinically significant >4 mm (Table 5). In these groups, auxiliary procedures PCNL, open surgery, or ureteroscopy is needed. Among 20 patients, 6 patients had stone size 8-15 mm. Even though the stone size is smaller since the HU >1000 stone was not fragmented. 7 patients had stone size 16-25 mm and 7 patients had 26-35 mm. From the above study, it is obvious that size of the stone will not be able to predict the number of shock waves (even though moderate correlation) but stone density in HU will be able to predict the number of shocks needed in a better quantitative way.

The chemical composition of post-ESWL fragments was obtained in 80 patients by chemical dissolution method (qualitative analysis). 20 patients were not able to retrieve

### Table 1: Distribution of symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of patients (%)</th>
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<tr>
<td>Flank pain</td>
<td>80 (80)</td>
</tr>
<tr>
<td>Dysuria</td>
<td>10 (10)</td>
</tr>
<tr>
<td>Fever</td>
<td>5 (5)</td>
</tr>
<tr>
<td>Asymptomatic incidently detected</td>
<td>20 (20)</td>
</tr>
</tbody>
</table>

### Table 2: Distribution of size

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Number of patients</th>
</tr>
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<tbody>
<tr>
<td>8-15</td>
<td>70</td>
</tr>
<tr>
<td>16-25</td>
<td>17</td>
</tr>
<tr>
<td>26-35</td>
<td>13</td>
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</table>

### Table 3: Distribution of location

<table>
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<th>Location</th>
<th>Number of patients</th>
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<tbody>
<tr>
<td>Pelvis</td>
<td>58</td>
</tr>
<tr>
<td>Upper calyx</td>
<td>25</td>
</tr>
<tr>
<td>Middle calyx</td>
<td>10</td>
</tr>
<tr>
<td>Lower calyx</td>
<td>7</td>
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### Table 4: Distribution of fragments

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<tr>
<th>Description</th>
<th>Stone free</th>
<th>Fragmented completely</th>
<th>Residual fragments</th>
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<tr>
<td>Number of patients</td>
<td>68</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Stone density</td>
<td>320-750</td>
<td>750-1000</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>Number of shocks</td>
<td>800-2200</td>
<td>2500-6000</td>
<td>5000-7500</td>
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</table>

### Table 5: Distribution of mean shock

<table>
<thead>
<tr>
<th>CT HU</th>
<th>Number of patients</th>
<th>Mean shock</th>
<th>Standard deviation</th>
<th>One-way ANOVA $F$-test</th>
</tr>
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<tbody>
<tr>
<td>&lt;750</td>
<td>68</td>
<td>1978.99</td>
<td>775.754</td>
<td>$F=199.8$, $P=0.001$ significant</td>
</tr>
<tr>
<td>750-1000</td>
<td>12</td>
<td>3690.91</td>
<td>1454.960</td>
<td></td>
</tr>
<tr>
<td>&gt;1000</td>
<td>20</td>
<td>7175.00</td>
<td>1453.444</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>3206.50</td>
<td>2300.106</td>
<td></td>
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</tbody>
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CT: Computed tomography, HU: Hounsfield unit
their stones. Uric acid stones were completely disappeared in a single sitting with ESWL (HU 320-350). Struvite stones had HU 400-600, stone fragmented and cleared completely. Mixed stones had varying, HU between 400 and 1600. Stone fragmentation also varies.

DISCUSSION

ESWL has revolutionized the treatment strategy of urolithiasis worldwide and continues to be a major therapeutic modality for treating a majority of upper urinary tract stones. It is non-invasive in nature along with high efficacy has resulted in outstanding patient and surgeon acceptance. ESWL is the preferred modality of treatment for renal stones <2 cm. However, SFR after treatment has never been near 100% and has been in the range of 65-75% (present study 80%). The success rate of ESWL is determined by factors such as stone size, composition, location, presence of obstructive changes, and anatomical anomalies. Stone composition is one hidden factor which decides the fragility of calculus and its susceptibility to ESWL. The number of shocks required for fragmentation is related not only to the size of the stone but also to its hardness (or) brittleness which largely depends on its chemical composition. CT being an easily available modality of investigation and because of its increased sensitivity to density differences has been used to measure stone densities of various types of calculi, and attempts are made to correlate the density with chemical composition.

Hillman et al. reported 89% overall accuracy of CT scan to categorize uric acid, calcium oxalate, and struvite calculi. On the contrary, Kuwahara et al. reported that there is no correlation between the attenuation value and the chemical composition of renal stone. In our study, we also could not find any correlation between CT density and chemical composition of stone. The predominant stone (Mixed stone) of calcium oxalate, phosphate, and uric acid had stone HU ranging from 400 to 1600 and the values were overlapped for various calculi.

Joseph et al. reported overall success rate of 80% for calculus up to 2 cm when they assessed the susceptibility of stone fragmentation by ESWL. According to the HU, they found that the success rate for stone with attenuation value <1000 HU was significantly higher than that for stone with value >1000 HU. In their study, they found a significant correlation between number of shocks required for stone fragmentation and the attenuation value of the stone.

We noted that 80/100 patients with CT density of <1000 HU had significantly successful treatment. In the I sitting ESWL, 68 patients have cleared their stone. 7 patients pulverized their stone in II sitting ESWL and 5 patients undergone III sitting ESWL for complete clearance. 20 patients with CT HU >1000 HU had unsuccessful fragmentation even after 7500 shock waves. Thus, the CT density of the renal stone is inversely proportional to the fragmentation and clearance.

The success rate of ESWL is also related to chemical composition of stone. Uric acid and struvite stones having HU <750 easily fragment. Mixed calcium oxalate and cystine stones have HU <1000, these stones are ESWL resistant because of their greater deformation capability and higher resistance to crack propagation. Ductile stones (smooth cystine calculi) can absorb the energy of cavitation jet impact through plastic deformation thus preventing the cavitation damage produced on the anterior surface of stone.

Size and location of stones are the other variables depending on which success of ESWL fairly correlates.

Joseph et al., in study of 30 patients, those with calculi <500 HU had complete clearance in 2500 shocks. Stones with 500-1000 HU had clearance rate of 86% and median number of shock waves 3390. Patients with calculi >1000 HU had clearance rate of 55% requiring a median of >3000 shock waves.

Motley et al. concluded that there is no significant difference between density values of calcium oxalate and calcium phosphate calculi.

Pareek et al. correlated calculus density with clearance in 50 patients. 36% of patients had residual calculi with their mean density of >900 HU compared to 74% clearance with mean density of 500 HU.

A total of 100 patients with renal calculi measuring between 8 and 35 mm were included in our study. The stone density measured on NCCT and mean density value obtained. All patients were treated with ESWL, and the susceptibility of renal stone to fragmentation was correlated with stone density and its chemical composition.

The overall success rate of ESWL was 80% in our study. 68/100 patients with <750 HU had 100% stone fragmentation and clearance. 12/100 patients with 750-1000 HU had 59% stone fragmentation and clearance in the II sitting and 41% had stone fragmentation and clearance in III sitting (retreatment with ESWL needed). 20/100 patients with HU >1000 had significant residual fragment even after III sitting ESWL (auxiliary procedures needed) (there was a statistically significant difference with P < 0.001).
Comparing stone size with ESWL fragility, even though stone size >2.5 cm, if the stone density is <750 HU stone fragmentation is 100%.

Even if the stone size <15 mm, a stone density of >1000 HU shows poor fragmentation with ESWL.

On stone composition analysis, uric acid and struvite stones had fragmented completely in the I sitting. The chemical composition of mixed renal stones did not correlate with attenuation value of stone.

CONCLUSION

For stones with HU <750 and stone size even up to 3.5 cm, SFR of 100% can be achieved with ESWL. For stones with 750-1000 HU, patient may need re-treatment (multiple sittings ESWL). For stones with HU >1000, other modalities of treatment (endoscopic and open stone surgery) are preferable to ESWL. NCCT estimation of stone density by HU predicts the successful outcome of ESWL therapy.

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Diabetic Maculopathy in Nonproliferative Diabetic Retinopathy in India: A Prospective Nonrandomized Clinical Study

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Diabetes mellitus (DM) is a chronic metabolic disorder caused by an absolute or relative deficiency of insulin, an anabolic hormone. Insulin is produced in the pancreas by the beta cells of islets of Langerhans. Absence, destruction, or loss of these cells causes an absolute deficiency of insulin, leading to Type 1 diabetes (insulin-dependent DM). Materials and Methods: In this study, the pattern of presentation of diabetic maculopathy in nonproliferative diabetic retinopathy (NPDR) in diabetics reporting to tertiary eye care hospital during July 2009-November 2010 including the incidence of the different type of maculopathy in NPDR, relationship between serum cholesterol and hard exudates in diabetic maculopathy, effect of laser on visual acuity in treated and untreated patients, role of optical coherence tomography in diabetic maculopathy. This study was conducted by collecting details including age, sex, referring institute, duration of diabetes, blood sugar, and associated systemic complications such as nephropathy, neuropathy, hypertension, hyperlipidemia, and CAHD were noted. Vision in both eyes was tested using Snellen's visual acuity chart.

Results: This study revealed that diabetic maculopathy is the most common cause of visual loss in a patient with diabetic retinopathy and periodic follow-up and examination is necessary to detect the involvement of macula at an earlier stage.

Conclusion: Early treatment with photocoagulation can stabilize the visual acuity and prevent further visual loss.

Key words: Diabetes, Fundus florescent angiography, Maculopathy, Retinopathy

INTRODUCTION

It would be worthwhile to quote Sir. Stewart Dude Elder's words on diabetic retinopathy. “It is one of the major tragedies of ophthalmology in the present generation, always common and rapidly becoming still more common, affecting the young as well as aged, predictable but not preventable and relatively untreatable, chronic and progressive in its course and leading to blindness in a distressing of cases.”1-3

DM is a chronic metabolic disorder caused by an absolute or relative deficiency of insulin, an anabolic hormone. Insulin is produced in the pancreas by the beta cells of islets of Langerhans. Absence, destruction, or loss of these cells causes an absolute deficiency of insulin, leading to Type 1 diabetes (insulin-dependent DM [IDDM]). Most children have IDDM and a lifetime dependence on exogenous insulin.4,8
Type 2 diabetes (non-IDDM [NIDDM]) is a heterogeneous disorder. Patients with NIDDM have insulin resistance, and their beta cells lack the ability to overcome this resistance. Although this form of diabetes previously was uncommon in children, 20% or more of new patients with diabetes in childhood and adolescence now have NIDDM, a change associated with increased rates of obesity.8-12

With an estimated 35 million people with diabetes, India has the world’s largest diabetic population. 20-25% diabetics

### Table 1: Statistics on age group of patients

<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Number of patients (%)</th>
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</thead>
<tbody>
<tr>
<td>21-30</td>
<td>3 (6)</td>
</tr>
<tr>
<td>31-40</td>
<td>4 (8)</td>
</tr>
<tr>
<td>41-50</td>
<td>11 (22)</td>
</tr>
<tr>
<td>51-60</td>
<td>16 (32)</td>
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<tr>
<td>61-70</td>
<td>13 (26)</td>
</tr>
<tr>
<td>71-80</td>
<td>3 (6)</td>
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### Table 2: Early onset diabetes mellitus with maculopathy

<table>
<thead>
<tr>
<th>Duration</th>
<th>Number of patients</th>
<th>Number of patients with maculopathy</th>
<th>% of DME</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 years</td>
<td>5</td>
<td>0</td>
<td>0</td>
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<tr>
<td>&lt;10 years</td>
<td>1</td>
<td>1</td>
<td>11.1</td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>3</td>
<td>3</td>
<td>33.3</td>
</tr>
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</table>

### Table 3: Incidence of diabetic maculopathy with advancing severity of diabetic retinopathy

<table>
<thead>
<tr>
<th>Type of NPDR</th>
<th>Number of patients</th>
<th>% of patients with DME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Moderate</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Severe</td>
<td>25</td>
<td>50</td>
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</table>

NPDR: Nonproliferative diabetic retinopathy

### Table 4: FFA types

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of cases</th>
<th>Total</th>
<th>% of DME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focal</td>
<td>22</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Diffuse</td>
<td>18</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Ischemic</td>
<td>10</td>
<td>22</td>
<td>22</td>
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</tbody>
</table>

FFA: Fundus fluorescein angiography

### Table 5: Serum lipids versus hard exudates

<table>
<thead>
<tr>
<th>Total cholesterol</th>
<th>LDL cholesterol</th>
<th>Total/HDL cholesterol</th>
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<tbody>
<tr>
<td>Level</td>
<td>Number of patients</td>
<td>% of patients</td>
</tr>
<tr>
<td>&lt;148</td>
<td>10</td>
<td>10</td>
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<tr>
<td>148-165</td>
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<td>166-181</td>
<td>12</td>
<td>12</td>
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<tr>
<td>182-203</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>&gt;204</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

LDL: Low-density lipoprotein, HDL: High-density lipoproteins

Aim

This study is performed with the aim to know the pattern of presentation of diabetic maculopathy in nonproliferative diabetic retinopathy (NPDR) in diabetics reporting to tertiary eye care hospital between July 2009

Figure 1: Focal maculopathy with focal laser in inferotemporal to macula

Figure 2: (a) Diffuse macular edema in fundal fluorescein angiography, (b) grid laser in fundus photography
and November 2010. Special emphasis was laid on the following aspects.
1. Incidence of the different type of maculopathy in NPDR.
2. Relationship between serum cholesterol and hard exudates in diabetic maculopathy.
3. Effect of laser on visual acuity in treated and untreated patients.
4. Role of optical coherence tomography in diabetic maculopathy.

**MATERIALS AND METHODS**

The study was conducted from July 2009 to November 2010. 100 eyes of 50 patients who were referred to tertiary eye care hospital, Regional Institute of Government Ophthalmic Hospital, Madras medical college, Chennai, Tamil Nadu, India, were evaluated. Details including age, sex, referring institute, duration of diabetes, and blood sugar and associated systemic complications such as nephropathy, neuropathy, hypertension, hyperlipidemia, and coronary artery diseases were noted. Vision in both eyes was tested using Snellen’s visual acuity chart. Other materials used were:

1. Direct ophthalmoscope
2. Indirect ophthalmoscope
3. Slit lamp examination with +90D lens
4. Schiotz and Gold-mann applanation tonometer
5. Gold-mann 3 mirror
6. Topcon fundus camera
7. Laser machine (COHERENT)
8. Fundus fluorescein angiography
9. Blood pressure
10. Urine albumin, sugar
11. Diabetic profile
12. Optical coherence tomography.

Procedure
Patients referred or detected as having diabetic retinopathy were taken into study. This included IDDM and NIDDM patients. History relevant to time of onset of DM, duration, family history, drug schedule, and dietary habits was taken. Associated systemic factors such as hypertension, ischemic heart disease, and renal disease were recorded.

Proliferative diabetic retinopathy, retinopathy without maculopathy, associated eye problems such as glaucoma, uveitis, central retinal vein occlusion, and hypertensive retinopathy were exclusions of this study.

Complete ocular examination was done:
- Best corrected visual acuity
- Intraocular pressure
- Anterior segment examination
- Amsler grid in selected patients
- OCT in selected patients
- Visual fields
- Fundus examination - pupil was dilated with 1% tropicamide eye drops, fundus examination was done with a direct ophthalmoscope, indirect ophthalmoscope, slit lamp with +90D lens and Goldmann 3 mirror.
- Fundus photograph was taken with Topcon fundus camera
- Fundus fluorescein angiography was done in cases with 3 ml of 20% sodium fluorescein injection IV in dorsal vein of hand with the patient seated in front of fundus camera.

Importance was given to:
- Leaking microaneurysms and its distribution
- Focal leak from vessels
- Diffuse leak
- Ischemia and capillary non perfusion zones.

Criteria for Photocoagulation
- Focal leak at peri and parafoveal area signifying macular edema. Direct treatment of leaking microaneurysms, were carried out with 200 u spot size of Argon laser for 0.05-0.1 s to produce mild-to-moderate intensity burns.
- Diffuse leak and cystoid leak were treated with 50-200 u spot burns for 0.05-0.1 s in a grid pattern.
- Ischemic maculopathy associated with ischemia elsewhere in fundus were given scatter photocoagulation.

Patients were followed fortnightly for 2 months and then at monthly intervals. Visual acuity and fundus examination made and documented.12,20

RESULTS
Out of 100 eyes, 21 patients were below 50 years and 29 patients were above 50 years.

Among early onset type, 33.3% had macular edema in patients with duration of 20 years, and 11.1% had macular edema in the duration of 10 years. Among late onset type of diabetes, and those on oral hypoglycemic agents with duration of 20 years 22.2% had macular edema and in those with duration of 10 years, 11.1% had macular edema. Among the late onset type of diabetes and those on insulin with duration of 20 years 38.4% had macular edema, and those with duration of 10 years 15.3% had macular edema. 50% of patients with severe NPDR had macular edema as compared to 40% with moderate NPDR and 10% with mild NPDR. In fundus fluorescein angiography (FFA), 44% had focal type, 34% had diffuse type, and 22% had ischemic type. When total cholesterol >204 mg/dl 35% of the patients had hard exudates compared to 10% when the levels were <148 mg/dl. When low-density lipoprotein (LDL) cholesterol >133 mg/dl 30% had hard exudate as compared to 10% when levels were <86 mg/dl. When total cholesterol/high-density lipoproteins (HDL) cholesterol >4.429, hard exudates were present in 29% and when levels <2.803, 5% had hard exudates. Among untreated patients, 30% had moderate visual loss, and 10% had severe visual loss. Among laser treated patients, 25% had moderate visual loss, and 2.5% had severe visual loss. Following focal photocoagulation vision improved in 17.3%, worsened in 8.6% and unchanged in 77%. Following grid laser vision improved in 16.6%, worsened in 22.2%, unchanged in 61.1%. 31% patients had 6/24-6/36 visual acuity on presentation, and 8% had <4/60. Patients with diffuse maculopathy had visual acuity in the range of 6/60-4/60 on presentation. Ischemic maculopathy patients had visual acuity of 6/24 or less on presentation. Most of the patients with a focal type of lesion had good visual acuity initially among treated patients retinal thickening persisted in 35% and 63% of untreated patients with OCT followed for 1 year (Tables 1-9 and Figures 1-5).

DISCUSSION
In our study, the predominant age group affected is the 51-60 years range 32% followed by 61-70 years range 26% and 41-50 years range 22%.

In our study, 54% cases are aged between 41 and 60. This correlates with the Wisconsin Epidemiological study of
diabetic retinopathy (Klein et al. Arch. 1986) revealed diabetic retinopathy more prevalent in the middle aged and elderly population affecting people aged 45-64 years.

Among early onset type, 33.3% had macular edema in patients with duration of 20 years, and 11.1% had macular edema in the duration of 10 years.

Among late onset type of diabetes, and those on oral hypoglycemic agents with duration of 20 years 22.2% had macular edema and in those with duration of 10 years, 11.1% had macular edema.

Among the late onset type of diabetes and those on insulin with duration of 20 years 38.4% had macular edema, and those with duration of 10 years 15.3% had macular edema. 50% of patients with severe NPDR had macular edema as compared to 40% with moderate NPDR and 10% with mild NPDR. This correlates with Wisconsin Epidemiological study of diabetic retinopathy which shows macular edema more prevalent in severe NPDR when compared to others.

In FFA, 44% had a focal type, 34% had diffuse type, and 22% had ischemic type. It correlates with ETDRS study which showed nearly same incidence of different type of maculopathy.

When total cholesterol >204 mg/dl 35% of the patients had hard exudates compared to 10% when the levels were <148 mg/dl. When LDL cholesterol >133 mg/dl 30% had hard exudate as compared to 10% when levels were <86 mg/dl. When total cholesterol/HDL cholesterol >4.429, hard exudates were present in 29% and when levels <2.803, 5% had hard exudates. This correlates with ADA 2005 study of medical care in DM: Diabetic care 2006;29,21,22

Among untreated patients, 30% had moderate visual loss, and 10% had severe visual loss. Among laser treated patients, 25% had moderate visual loss, and 2.5% had severe visual loss. This correlates with the ETDRS conclusions that laser treatment is effective in preventing visual acuity loss. Following focal photocoagulation vision improved in 17.3%, worsened in 8.6% and unchanged in 77%. This correlates with ETDRS conclusions that focal laser is effective in preventing worsening of visual acuity after 2 years. Following grid, laser vision improved in 16.6%, worsened in 22.2%, and unchanged in 61.1%. This correlates with ETDRS conclusions that grid laser is effective in preventing worsening of visual acuity after 2 years.

Among treated patients, retinal thickening persisted in 35%, and 63% of untreated patients with OCT followed for 1 year. 31% patients had 6/24-6/36 visual acuity on presentation, and 8% had <4/60. Hence, the majority of our patients were presenting in the range of 6/24-6/36 which correlated with a study by Becker et al. Patients with diffuse maculopathy had visual acuity in the range of 6/60-4/60 on presentation. Ischemic maculopathy patients had visual acuity of 6/24 or less on presentation. Most of the patients with a focal type of lesion had good visual acuity initially.23,24

CONCLUSION

1. Incidence of diabetic maculopathy common after 50 years with diabetes of longer duration.
2. Disease affects both eyes although asymmetrically.
3. Amsler grid is a useful diagnostic aid provided the intelligence of patient is good.
4. FFA is an important diagnostic tool in classifying the type of maculopathy.
5. Focal lesions are more common than other two types.
6. Focal type improves with focal photocoagulation; diffuse type shows some improvement with grid laser and ischemic lesions has worst prognosis as compared to others.
7. OCT is an important diagnostic tool to detect early maculopathy.
8. Diabetic maculopathy is the most common cause of visual loss in a patient with diabetic retinopathy. Periodic follow-up and examination are necessary to detect the involvement of macula at an earlier stage. Early treatment with photocoagulation can stabilize the visual acuity and prevent further visual loss.

REFERENCES


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Clinicopathological Study of Congential Pulmonary Airway Malformations

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Abstract

Introduction: Congenital pulmonary airway malformation (CPAM) is a rare developmental abnormality of the lung. The underlying feature of a CPAM is an excessive over growth of terminal respiratory bronchioles and forming cysts of various sizes. This abnormal lung tissue is of defective epithelial-mesenchymal architecture.

Aim: The aim of the study is to study the various modes of presentation of CPAM, the effectiveness of antenatal ultrasonogram and pathology of these lesions.

Materials and Methods: All patients with radiologically proven CPAM were included in this study. The patients were subjected to detailed clinical examination, and relevant investigations were performed, namely, chest X-ray, and computed tomography (CT) scan chest. CPAM diagnosed cases were undergone thoracotomy and excision of affected lobe.

Results: Of these 20 patients, seven were antenatally diagnosed. Six patients presented with fever and cough, CT scan detected 16 cases of CPAM, lower lobe was affected in 11 patients, in our series, 94% of cases belong to stocker Type I lesion.

Conclusion: An early intervention of CPAM patients causes less morbidity.

Key words: Antenatal ultrasound, Congenital pulmonary airway malformation, Stocker’s pathological types

INTRODUCTION

Congenital pulmonary airway malformation (CPAM) is a rare developmental abnormality of the lung. They are similar to benign lung tumors.¹ Congenital lesions of lung are rare, with overall incidence of 1/10000 to 1/25000 births.² The underlying feature of a CPAM is an excessive over growth of terminal respiratory bronchioles and forming cysts of various sizes. There are different types of lesions (types 0-3), some associated with cystic areas and adenomatous overgrowth of the terminal bronchioles.³ This abnormal lung tissue is of defective epithelial-mesenchymal architecture. The congenital lesions are detectable of prenatal ultrasound. They appear as solid or cystic masses. Mode of presentation of CPAM varies widely in antenatal and neonatal period.

Aim

The aim of the study is to study the various modes of presentation of CPAM, the effectiveness of antenatal ultrasonogram (USG) and pathology of these lesions.

MATERIALS AND METHODS

This prospective study was conducted in Institute of Child Health and Hospital for Children, Madras Medical College, Chennai, Tamil Nadu, India. All patients with radiologically proven CPAM were included in this study. Other cystic lesions of chest were excluded from the study. The patients were subjected to detailed clinical examination, and relevant investigations were performed, namely, chest X-ray, and computed tomography (CT) scan chest. CPAM diagnosed cases were undergone thoracotomy and excision of affected lobe was done 17 patients. The treatment modalities were studied and patients were followed up to
assess the effectiveness after 6 months of surgery with relevant investigations and extended to the available period. The results were tabulated and analyzed.

**RESULTS**

Of these 20 patients, seven were antenatally diagnosed. The majority five of antenatally detected patients were asymptomatic at the time of presentation. Remaining two patients were admitted with complaints of having respiratory distress since birth. In this study, 11 patients were male, and the remaining nine were female. There is no sex predilection for patients with CPAM.

Among our study group of 20 patients, seven patients presented in the neonatal period, 11 presented between 1 month and 1 year, two patients presented between 1 and 5 years. No patient was seen above 5 years of age. This means that 90% of CPAM patients in our study are below 1 year of age. High degree of suspicion is needed to detect CPAM in infants if they are not antenatally diagnosed (Table 1).

In our study, two patients had congenital heart disease, and one patient had glycogen storage disease Type III. In our study, there was no association with bronchopulmonary sequestration (BPS).

In the patients who were enrolled for study, 18 underwent at least one antenatal USG. Two patients did not have any antenatal USG. Among this group of 18, only seven were suspected to have cystic lesion in lung. This means that only 39% patients were detected antenatally. Of the 18 patients who went antenatal USG, only one patient had polyhydramnios. However, this infant was not detected to have CPAM antenatally.

CPAM presents in various forms. In our study, five asymptomatic patients, all these five were antenatally detected. Three patients presented with complaints of respiratory distress since birth. Among these three patients, two patients presented on the 1st day of life. One patient with respiratory distress since birth presented on 34th day of life.

Six of our patients presented with fever and cough. Among this group, three were initially treated outside as bronchopneumonia, two patients as empyema and one as loculated pyopneumothorax. Four CPAM patients presented with difficulty in breathing and two presented with wheeze (Table 2).

Patients with empyema and loculated pyopneumothorax were initially treated with intercostal chest tube drainage. Only later they were found to have CPAM.

All of our patients had chest radiography at the time of admission. Radiologists were able to suggest the diagnosis of CPAM in only ten patients. For two patients they gave the diagnosis of lung cyst, and for five patients they gave the diagnosis of bronchopneumonia. Two patients were diagnosed to have empyema and one was diagnosed to have loculated pyopneumothorax (Table 3).

CT scan was done in 18 of our CPAM patients. Among these children, 16 were diagnosed to have CPAM, one was found to have BPS, and one was diagnosed as loculated pyopneumothorax. This shows postnatal CT scan has a higher diagnostic value for detecting lung lesions (Table 4).

In our study group, nine patients had right sided lesions, ten patients had left-sided lesions and one had bilateral CPAM (Table 5).

Lower lobe was affected in 11 patients, upper lobe two patients, middle lobe two patients, and three patients had

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Number of cases (%)</th>
</tr>
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<tbody>
<tr>
<td>Up to 1 month</td>
<td>7 (35)</td>
</tr>
<tr>
<td>1 month to 1 year</td>
<td>11 (55)</td>
</tr>
<tr>
<td>1-3 years</td>
<td>1 (5)</td>
</tr>
<tr>
<td>3-5 years</td>
<td>1 (5)</td>
</tr>
<tr>
<td>5-12 years</td>
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<table>
<thead>
<tr>
<th>Presenting complaints</th>
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<td>Asymptomatic</td>
<td>5</td>
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<tr>
<td>Respiratory distress since birth</td>
<td>3</td>
</tr>
<tr>
<td>Fever with cough</td>
<td>6</td>
</tr>
<tr>
<td>Dyspnea with cough</td>
<td>4</td>
</tr>
<tr>
<td>Cough with wheeze</td>
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<table>
<thead>
<tr>
<th>X-ray findings</th>
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<td>10</td>
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<tr>
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<td>5</td>
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<td>Lung cyst</td>
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<tr>
<td>Emphyema</td>
<td>2</td>
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<td>Pyopneumothorax</td>
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<td>CT scan picking up CPAM</td>
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</tr>
<tr>
<td>BPS</td>
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</tr>
<tr>
<td>Loculated pyopneumothorax</td>
<td>1</td>
</tr>
</tbody>
</table>

BPS: Bronchopulmonary sequestration, CPAM: Congenital pulmonary airway malformation, CT: Computed tomography
both upper and middle lobe involvement (Table 6). Lower lobectomy was done in ten patients (right - 3; left - 7), upper lobectomy was done in 5 patients (right - 4, left 1), and middle lobectomy was done in five patients. Among the above patients combined upper and middle lobectomy was done in three patients. One patient who presented with empyema also underwent decortication.

Post-operative period was uneventful in eight patients, 4 patients had wound infection and 2 patients need post operative ventilatory support. Antenatal detected patients were operated after 1 month of age.

Average duration of hospital stay for operated patients was 14.4 days. However, the average hospital stay duration of antenatal detected patients was significantly less. It is about 10 days for antenatal detected patients. Hence, it is clear that infected CPAM patients had longer hospital stay.

In our series, 94% of cases belong to Stocker Type I lesion and 6% of cases belong to Stocker Type III lesion (Table 7).

In our series, there is no mortality among operated patients. Among the 17 patients who we have operated, 15 patients turned up for follow-up. Out of this, two patients were treated for respiratory tract infection. Their chests X-ray are normal.

**DISCUSSION**

In our study, among antenatally detected seven patients, only two were symptomatic at birth. These two patients were admitted with complaints of having respiratory distress since birth. In study done by Stanton et al., among antenatally detected 505 neonates, 16 (3.2%) became symptomatic in infancy.4

Most of the children operated in our study were in <5 years age group, early resection strategy to avoid the onset of symptoms. Truitt et al., argued that the risks associated with congenital lung lesions (infection and malignancy) justify intervention in the asymptomatic patient.5

In our study, two patients had congenital heart disease, and one patient had glycogen storage disease Type III congenital cystic adenomatoid malformations are usually isolated and sporadic although they have been associated with other anomalies (most commonly cardiac and renal) in 15-20% of cases.6

In our study, fever with cough was the most common presenting symptom in <7 years children. In study done by Giubergia et al., the most common presenting symptoms were respiratory distress in children under 6 months of age (40%) and recurrent pneumonia in older ones.7

In our study, lower lobe was affected in 11 patients and single lobe was affected commonly. Puri in endorses this by saying involvement is usually unilobar which is slight predilection for the lower lobes.1

In our study, infected CPAM patients had longer hospital stay than patients who underwent elective surgery. This was confirmed Stanton et al., who said for all ages, elective surgery was associated with significantly less complications than emergency surgery.4

Stocker et al., found pathological Type I lesions were the most common CPAM variety, accounts for 50-70% of diagnosed cases. In our study, we found maximum number of cases were of Type I cases, accounts for 96% of the patients.3

**CONCLUSION**

Most of the patients presented with symptoms of fever with cough and dyspnea. Antenatally detected patients, reported to the hospital earlier and they were mostly asymptomatic. Ability of X-ray to detect CPAM was
only 50%. CT scan has a greater success rate in picking up CPAM cases. Lower lobe involvement is significantly higher. Stockers Type I is the predominant type (94%) in our series.

REFERENCES

Drug-resistance Patterns in Malaria: A Randomized Control Trial

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Abstract

Introduction: Malaria is a life-threatening protozoan disease caused by the infection of erythrocytes with four species of protozoan organisms of genus Plasmodium namely Plasmodium falciparum, Plasmodium malariae, Plasmodium vivax, and Plasmodium ovale. It is transmitted by bite of female Anopheles mosquito (vector of illness). P. falciparum causes the most serious form of malaria with high mortality if detected late with complications as compared to other species.

Materials and Methods: Randomized control trial of 120 patients divided into 2 groups of 60 suffering from uncomplicated P. vivax malaria and 60 suffering from uncomplicated P. falciparum or mixed malaria (P. vivax + P. falciparum). Each group further subdivided into 3 subgroups of 20 with each group on different drug combination therapy of artesunate + doxycycline, quinine + doxycycline, and chloroquine + doxycycline.

Result: The results revealed that participants in both groups had male preponderance and spread out in various age groups with most clinical features resembling each other except for more symptoms and signs in Group B such as headache, vomiting, abdominal pain, and tenderness with pallor and thrombocytopenia as compared to Group A which reversed after successful trial of drug combinations. There was an early disappearance of fever and parasitic index in patients of P. vivax, that is, Group A as compared to those of uncomplicated falciparum or mixed malaria, that is, Group B.

Conclusion: Patients of uncomplicated P. vivax malaria responded well to use of chloroquine, although larger studies should be done to know if chloroquine alone is effective or not against vivax infection. Artesunate should have limited use in uncomplicated vivax infection to prevent resistance. Patients of uncomplicated falciparum or mixed malaria respond poorly to chloroquine. Artesunate followed by quinine are most effective drugs in uncomplicated falciparum and mixed malaria.

Key words: Artesunate, Chloroquine, Drug resistance, Malaria, Plasmodium vivax

INTRODUCTION

Malaria is one of the major public health problems in India. It is a protozoan disease transmitted by bite of an infected female Anopheles mosquito.

Malaria has been a global health hazard for centuries. At present, 100 countries in the world are considered malarious, almost half of which are in Sub-Saharan Africa and are responsible for 1.1 to 2.7 million deaths worldwide each year. Rest half are in the Southeast Asian countries (e.g. Thailand, Indonesia) and Western Pacific regions according to the World Health Organization (WHO).

Malaria is endemic in tropical and subtropical countries including India. The burden of malaria in Southeast Asia has been under appreciated despite the recent evidence suggesting the continent contributes 40% of world’s malaria cases. India contributes 77% of total malaria in Southeast Asia.

In India, vivax and falciparum are prevalent species and account for sizeable morbidity and mortality. Around 1.5 million cases are reported annually by the National Vector Borne Diseases Control Programme, of which 40-50% are due to Plasmodium falciparum. Delay in the treatment...
leads to serious consequences including death (20,000 per year). These figures are according to the hospital admissions and does not account for other countless death outside hospital, rural area and specifically where diagnostic and treatment facilities are not up to the mark and malaria toll is believed to be 13 times higher (nearly 2 lakhs). This could even surpass total HIV deaths in India. *Plasmodium vivax* is more dangerous and has high mortality according to the WHO, and one should treat it like *P. falciparum* malaria. Few studies have been done for *P. vivax* malaria earlier.15-23

High incidence of malaria is seen in many states of India where construction work is ongoing and stagnant water is available for mosquito to breed. Approximately 44 million population of tribal areas of Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Gujarat, Maharashtra, Bihar, Jharkhand, Rajasthan, Orissa, and Northeastern States (tropical and subtropical) suffer from malaria and 50% of these are falciparum malaria.

In Sub-Saharan Africa, majority of malaria associated morbidity and mortality occurs with *P. falciparum* infections. Recent studies suggest vivax malaria can become lethal in a similar way to falciparum malaria. It is important to note that 50% of vivax malaria prevalence is in Asia and including India. Most of the research and published data in malaria focus on *P. falciparum* and much less on *P. vivax* which is due to very heavy burden of mortality attributed to *P. falciparum* in Africa.24-30

Thus, the WHO has suggested that severe vivax malaria should be treated on the same line as complicated malaria.

Malaria remains uncontrolled due to following reasons:
1. Multiple drug resistance to various factors.
2. Misuse of antimalarial drugs particularly artesunate.
3. Non-availability of effective antimalarial vaccine.

Another factor which is emerging in developing countries is increasing the availability of duplicate drugs. This led India to stop the sale of artesunate tablets in the market.

Keeping above factors in mind, the present study is undertaken to evaluate the efficacy of various drugs in uncomplicated vivax and vivax + falciparum malaria. The drugs include chloroquine, quinine, and artesunate.31-35

Chloroquine - to find out the effectiveness in *P. vivax* malaria and uncomplicated *P. falciparum* malaria. Chloroquine has not been used for many years now in uncomplicated falciparum malaria. Hence, it is thought, it may have become effective in uncomplicated falciparum malaria.36-38

Quinine - to see the response in both types of malaria.

Artesunate - huge misuse of this drug led to decreased efficacy in both types of malaria.

**Aims**
1. To find out the uncomplicated vivax and falciparum +/- vivax malaria patients in our hospital medical admissions.
2. To find out the resistance to various antimalarial drugs in these patients.

**MATERIALS AND METHODS**

One hundred and twenty cases of smear positive (60 cases of *P. vivax* and 60 cases of *P. falciparum* or mixed malaria) were taken for the study.

**Inclusion Criteria**
Smear positive cases of vivax, falciparum, and mixed malaria in hospitalized patients.

**Exclusion Criteria**
1. History suggestive of malaria but smear negative
2. Complicated malaria with evidence of target organ damage
3. Pediatric age group <12 years
4. Pregnant women
5. Evidence of other associated infections such as respiratory, urinary, and HIV.
6. Patients presenting with smear positive reports who have received antimalarial drugs
7. History of allergy to doxycycline.

Participants fitting into above criteria were included in the study. Detailed history, general, and systemic examination were conducted.

Following investigations were done. Complete blood count peripheral smear for malarial parasite (MP).

**Parasitic Index**
Above tests were sent on day 1 before starting therapy and day 4; for all patients and on day 7, who did not respond to treatment by day 4.

- Renal function tests
- Liver function tests urine analysis
- ECG
- X-ray chest posteroanterior view
- Other relevant investigations if any

**Plan of study - the 120 patients were divided in two groups.**

**Group A** - Consists of 60 patients of vivax malaria.

**Group 8** - Consists of 60 patients of falciparum malaria or mixed falciparum and vivax malaria.
Each group was further divided into subgroups a, b, and c (each containing 20 patients).

Each patient was randomized to receive one of the following treatment options.

Subgroup a - chloroquine (25 mg/kg for 3 days) + doxycycline (100 mg/80)

Subgroup b - artesunate (2.4 mg/kg on 1st day) + doxycycline (100 mg/80) (1.2 mg/kg/day for 6 days)

Subgroup c - quinine (10 mg/kg for 7 days) + doxycycline (100 mg/80)

Patients were Assessed for Following Things and Criteria
1. Time taken for disappearance of fever
2. Time taken for smear to become negative
3. Decline in parasitic index
4. Patients who failed to respond to one of the options of treatment were subjected to relevant investigation on the 4th day and were switched over to either of other two regimens after reassessing the reports. Their repeat investigations were done on 1h day
5. Count the number of MP 1 000 red blood cells (RBC’s) to know the parasitic index.

Distribution of Male and Female Patients
A total of 120 cases of positive malaria (P. vivax, P. falciparum, and mixed varieties) were studied. The series included 97 male and 23 female patients.

The age and sex distribution of the cases are shown in Table 1.

Clinical Features
Following are the clinical features in two groups as shown in Table 2.

Specific Investigations
Peripheral smear both thick and thin for MP with parasite index (number of MP/1000 RBC’s) were evaluated as shown in Table 3.

The 120 participants in Group A and B were also allotted at random into three subgroups to the combination of antimalarial drugs as in Group A.

It is as follows:

Subgroups
A. Chloroquine and doxycycline
B. Quinine and doxycycline
C. Artesunate and doxycycline.
and the absence of MP in peripheral smears. If the response to the group of drugs was not satisfactory, the patent was switched on to the next alternative Group I, respectively, as shown in Table 4.

RESULTS

Out of 20, one patient did not respond to therapy and was reinvestigated with CBC, MP, and parasitic index and shifted to quinine + doxy. Fever settled down on the 6th day and investigations on the 7th day were normal (Table 5).

Routine Investigations

All the 120 patients under went following investigations.

The following Table 3 reveals the range of hemoglobin, white blood cells, and platelets.

DISCUSSION

One hundred and twenty cases of smear positive (60 cases of uncomplicated \textit{P. vivax} and 60 cases of uncomplicated \textit{P. falciparum} or mixed malaria) were taken for study.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{No. of patients (Subgroup a) 20} & \textbf{Disappearance of fever} & \textbf{Parasitic index clearance} & \textbf{Switch on to alternative combination} \\
\hline
& \textless{} Day 4 & \textgreater{} Day 4 & \textless{} Day 4 & \textgreater{} Day 4 \\
\hline
Chloroquine Plus Doxycycline & 13/20 (65\%) & 7/20 (35\%) & 5/20 (25\%) & 15/20 (75\%) \\
& To artesunate plus Doxy \\
20 patients & & & & \\
\hline
Out of 20 patients, 15 who did not respond to therapy were reinvestigated with CBC, MP, and parasitic index on the 4th day. In 8 patients out of 15 who were reinvestigated parasitic index settled down on the 4th day and MP also became negative on the same day. Remaining 7 were reinvestigated and shifted to artesunate+doxy. Their fever settled down on ih day and MP became negative on same day. \\
No. of patients (20) & 8/20 & 12/20 & 7/20 & 13/20 \\
Subgroup b quinine and doxycycline combination & & & & \\
Out of 20 patients, 13 did not respond to therapy, so they were reinvestigated with CBC MP and parasitic index on the 4th day. Out of 13, one patient whose parasitic index was persisting settled down on ih day. Remaining 12 their fever settled down on the 6th day and they were reinvestigated on ih day for CBC MP and parasitic index. They became negative on ih day and parasitic index settled down \\
\hline
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\end{table}

\begin{table}[h]
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\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{No. of patients (20) subgroup (artesunate and doxycycline combination)} & 18/20 & 2/20 & 8/20 & 2/20 & 2/20 \\
& To quinine+doxy \\
\hline
Out of 20 patients two patients who did not respond to therapy were reinvestigated with CBC, MP, and parasitic index and were shifted to quinine+doxy and their fever settled down on ih day and were reinvestigated with CBCMP and parasitic index. MP and parasitic index settled down on the 7th day. \\
Group B (60 patients) & & & & & \\
No. of patients & 4 & 16 & 4 & 16 & 8/8 \\
(20) v Subgroup (a) Chloroquine + Doxycycline combination & & & & & \\
16 patients who did not respond to therapy were reinvestigated on the 4th day with cbcmp and parasitic index 8 out of them were shifted to artesunate+doxy. Fever of 8 patients settled down on the 6th day, and they were reinvestigated on ih day with CBC MP and parasitic index. All became negative Remaining 8 were shifted toquine+doxy . Fever of 8 patients settled down on ih day, and their MP and parasitic index became negative on the 7th day. \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{No. of patients (20) subgroup (b) quinine and doxycycline combination} & 18 & 2 & 18 & 2 & 2/20 \\
& To artesunate+doxy \\
\hline
Two patients who did not respond to therapy were investigated on 41 day with CBC MP and parasitic index and were shifted to artesunate+doxy. \\
Out of 2 patients, both's fever settled on ih day and MP and parasitic index became normal \\
No. of patients & 19 & 1 & 19 & 1/20 & \\
(20) & & & & & \\
Subgroup C (artesunate and doxycycline combination) & & & & & \\
\hline
\end{tabular}
\end{table}

The observations revealed that the participants in Group A and Group B had male preponderance and spread out in various age groups with most of clinical features resembling each other except for more symptoms and signs in Group B such as headache, vomiting, and abdominal pain and tenderness, pallor and low platelet counts as compared to Group A which reversed after successful trial of drug combinations.

There was an early disappearance of fever and parasitic index in patients of \textit{P. vivax} (Group A) as compared to those of \textit{P. vivax} and falciparum mixed infections (Group B) (Figure 1).
P. vivax group was named Group A and P. falciparum plus mixed group was named Group B.34-40

Sixty patients of Group A were subdivided in subgroup A, B, and C and 60 patients of Group B were subdivided in subgroup A, B, and C.

Subgroup a, b, and c of both groups were given:
- Subgroup a - chloroquine + doxy
- Subgroup b - quinine + doxy
- Subgroup c - artesunate + doxy

### Table 5: Investigations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group A (60 patients)</th>
<th>Group B (60 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb &lt;10.0 g%</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>Hb &gt;10.0 g%</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>WBCs &lt;4000/cmm (U.L.)</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>WBCs &gt;4000-11000/cmm (U.L.)</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Platelet counts &lt;30,000 to 50,000 (U.L.)</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Platelet counts &gt;51000 to 1,50,000 (U.L.)</td>
<td>40</td>
<td>49</td>
</tr>
</tbody>
</table>

Hb: Hemoglobin, WBC: White blood cells

Group A (60 patient - P. vivax infection)
**Subgroup a (chloroquine and doxycycline - 20 patients)**
Regarding the drug combinations in various subgroups, it was detected that the patients in Group A with chloroquine and doxycycline combinations had 65% success rate.

**Subgroup b (quinine and doxycycline - 20 patients)**
In patients of Group A on quinine and doxycycline combination, no patients were shifted and this group had 100% success rate.

**Subgroup c (artesunate and doxycycline - 20 patients)**
In patients of Group A, on artesunate and doxycycline combination, 18 out of 20 recovered fully and within 3 days (90% success rate).

Two patients had to be switched on to quinine and doxycycline combination for recovery.

Group B (60 Patient P. falciparum and Mixed Malarial Infections)
**Subgroup a (chloroquine and doxycycline - 20 patients) - 80% failure rate**
Four patients responded of this combination and 16 had to be switched over to other combinations, that is, artesunate
and quinine with doxycycline. In this subgroup, there vivax 20% success rate to the initial combination.

In a similar study at Arunachal Pradesh for uncomplicated P. falciparum malaria, chloroquine failure was 83%.

In a study conducted at Sonapur, Assam for assessing the susceptibility of uncomplicated falciparum malaria. Chloroquine failures were 34 out of 144 approximately 24% failure.41,42

In a study at Myanmar out of 111 patients of uncomplicated falciparum, malaria chloroquine showed 66.6% good response.42-47

Subgroup b (quinine and doxycycline - 20 patients) - 90% success rate

Eighteen out of 20 patient recovered fully with the disappearance of fever within next 3 days and only 2 patient at to be switched on to artesunate and doxycycline combination for complete recovery. This subgroup had 90% success rate.

Subgroup c (artesunate and doxycycline - 20 patients) - 95% success rate

In Group B, on artesunate and doxycycline combination, 19 out of 20 patients recovered fully with disappearance of fever within 3 days. Only 1 patient had to be switched over to quinine and doxycycline and he responded within 7 days. This subgroup had 95% success rate.

This study reveals that the best combination of drugs in P. vivax group infections and P. falciparum mixed malarial infection is artesunate followed by quinine along with doxycycline combination as compared to chloroquine with doxycycline.

However, in P. vivax (subgroup a of Group A), the patients did show a response (65%) to chloroquine and doxycycline drugs combination.49-51

They all were given Primaquine 15 mg daily × 14 days for the prevention of relapse.

Artesunate or quinine with doxycycline combination proved to be the ideal choice in mixed infection of P. falciparum and P. vivax cases and in drug resistance cases with chloroquine.

CONCLUSION

In this prospective study of 120 patients of uncomplicated malaria with P. vivax Group (60 Group A) and mixed infections of mixed and falciparum infections (60, Group B) were studied (97 males and 23 females) with age ranging from 16-80 years.48

All these patients were put on respective antimalarial drugs in various groups which revealed that the best medications were as follows:

1. In Group A (P. vivax), subgroup a with chloroquine and doxycycline combination therapy, 65% of patients responded well and 35% had to be switched to other groups. This present study is small comprising only 20 patients in each subgroup. Larger studies should be done to know whether chloroquine alone is effective or not against vivax infection.

2. In Group A subgroups (b) and subgroups (c), quinine and doxycycline combination and artesunate and doxycycline combination had 100% and 90% success rate, respectively. Artesunate should have limited use in uncomplicated P. vivax so that resistance does not occur.

3. In Group B, subgroup (a) on chloroquine and doxycycline combination, patients with falciparum malaria had 80% failure rate and had to be switched to other drugs such as artesunate or quinine to which they responded. Falciparum malaria responds poorly to chloroquine due to resistance to this drug.

4. In Group B, subgroup (b) and (c) on quinine and artesunate with doxycycline combinations had 90% and 95% success rate, respectively. Artesunate followed by quinine are most effective drugs in uncomplicated falciparum and mixed (vivax + falciparum) malaria.

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Profile of Immunoglobulin A Nephropathy Patients in a Tertiary Care Center

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Abstract

Introduction: Immunoglobulin A nephropathy (IgAN) is being recognized as the most common glomerular disease worldwide. The prevalence and clinical picture varies from region-to-region.

Aim: The aim of the study is to study the clinicopathological profile and risk factors of IgAN patients admitted at our tertiary care.

Materials and Methods: Prospective observational study in 27 patients with biopsy proven IgAN.

Results: Out of 27 patients, renal syndrome included nephrotic syndrome in nine (33.3%), the nephritic syndrome in three (11.1%), rapidly progressive renal failure in four (14.8%), acute kidney injury in two (7.4%), and end-stage kidney disease in two (7.4%). 18 (66.6%) were presented with renal failure at presentation.

Conclusion: Nephrotic syndrome is the most common clinical presentation in IgAN. The majority presented with renal failure at entry into the study. Severe MEST (Mesangial hypercellularity, Endocapillary hypercellularity, Segmental sclerosis, Tubular atrophy/interstitial fibrosis) scoring was significantly associated with renal failure at presentation. Complete or partial remission of proteinuria had less chance for the progression to chronic kidney disease.

Key words: End-stage kidney disease, Immunoglobulin A nephropathy, Renal biopsy

INTRODUCTION

Primary immunoglobulin A nephropathy (IgAN) is defined as the presence of IgA dominant glomerular deposition in the absence of systemic or other non-renal diseases. It is the most common biopsy-proven primary glomerular disease in the world. There is a wide geographical variation existing around the globe, with incidence varying from 2% to 52%. In some countries such as Japan, China, Singapore, Hong Kong, and Australia, the statistics show that nearly half of the biopsy-proven primary glomerular disease is IgAN.¹ In the European countries, IgAN accounts for 10-20% of the total kidney biopsies. In the United States, this disease is common in certain areas. The incidence is dependent, to a large extent, on variations in the policies of renal biopsy among different countries. Similarly, clinical features also vary from mild-to-severe forms.²⁴ The most common presentations include synpharyngitic macroscopic hematuria, microscopic hematuria with proteinuria, and hypertension and chronic renal failure. The relatively rare presentations include malignant hypertension, acute nephritic syndrome, acute renal failure, and nephrotic syndrome. It presents with a constellation of clinical syndrome ranging from asymptomatic urine abnormalities to smoldering rapidly progressive glomerulonephritis (RPGN).⁵⁷ Incidence in India varies between 8.6 and 16%. With the advance in genetic, more molecular pathways are unraveled, and pathogenesis were defined little better than previous, so this most common glomerulonephritis is revealing its secrets. A better understanding of glycation, galactosylation molecular machineries in depth of enzymes and chaperone, the better search of happenings of talks of mesangium, podocytes, and proximal tubule through cytokines and receptors, better knowledge of mucosa marrow axis and toll-like receptor clearly will open a better prospectus in treatment.⁸⁻⁹
Aim
The aim of the study is to study the clinicopathological profile and risk factors of IgAN patients admitted at our tertiary care.

MATERIALS AND METHODS
This prospective observational study was conducted in Department of Nephrology, Madras Medical College, Chennai. All patients who have biopsy proven IgAN under care of the Department of Nephrology will be included in the study. Patients with liver disease, psoriasis, malignancy, human immune deficiency virus, systemic lupus erythromatosus, rheumatoid arthritis, reactive arthritis, and diabetic nephropathy were excluded from the study. Patients were subjected to urinary examination includes urine for protein, deposits such as red blood cell and white blood cell. Urine was analyzed for red blood cell cast, white blood cell cast. Urine protein/creatinine ratio was done. Patients underwent hematological investigation such as blood hemoglobin, total count, differential count, and peripheral smear study. Blood investigation includes blood urea, serum creatinine, serum electrolyte, and lipid profiles were taken. Liver function test including serum bilirubin were taken. Glomerular filtration rate (GFR) was estimated by Cockcroft gualt equation (ml/min). Urine and blood was sent for culture and sensitivity. Ultra sonogram of the abdomen was done. Renal biopsies were done on those presented with unexplained renal failure, nephrotic syndrome, and nephritic syndrome. Renal biopsy tissues sent for histopathological examination. These were done by light microscopy and immunofluorescence study. Glomeruli, tubule, interstitial, and vessel were examined with hematoxylin and eosin, periodic acid Schiff, and trichrome. MEST scoring was done. Immunofluorescence studies for IgA, IgM, IgG, C3, and C1q were done. Intensity graded from 0 to 4. Those with 2 + and more of dominant or codominant deposit of IgA, diagnosis of IgAN was made. After excluding those who met exclusion criteria diagnosis of primary IgAN were made. Patients were treated according to clinical syndrome. Patients with acute kidney injury (AKI) where there was no renal improvement then the biopsy was attempted at 5th day to exclude crescents or acute tubular necrosis.

RESULTS
A total of 29 patients with biopsy proven IgAN were included in the study. Of which two who present with end stage renal disease at presentation were excluded from the study. 27 were finalized into this study. 17 (62.9%) were male. The follow-up period ranged from 6 to 18 months. The mean age at presentation was 27.3 years. 11 were presented in 10-19 years age groups (40.7%), followed by seven in 20-29 years age groups (20.9%). Two were in 30-39 years age groups (7.4%). Two were in 40-49 years age groups (14.8%). Two were in 50-59 years age groups (7.4%), and one was in 60 years. Clinical presentation of patients was classified as in Table 2. Macrophaematuria was noted in 11 (40.7%). Hypertension prevailed in 16 (59.3%). Edema was present in 20 (74.1%). Oliguria was seen in 18 (66.6%). Two were (7.4%) presented with hypertensive encephalopathy. Seven (25.9%) had hypertensive retinopathy (Table 1).

Depending upon clinical syndrome patients were categorized as in Table 2. Nine had the nephrotic syndrome (33.3%), the nephritic syndrome was noted in three (11.1%). Four were presented with rapidly progressive renal failure (14.8%). Two presented with AKI (7.4%). Those who presented with end-stage renal failure at presentation were excluded from the study.

Renal biopsy findings were tabulated as follows in Table 3. Scoring was based on Oxford MEST. Mesangial score (M0 and M1) was seen in nine (33.3%) and 19 (70.3%) patients respectively. Endocapillary cellularity (E1) was noted in 14 (51.8%). Sclerosis score (S0 and S1) observed in 14 (51.8%)

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</tr>
<tr>
<td>Macrohematuria</td>
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<td>Edema</td>
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<td>Oliguria</td>
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<tr>
<td>Hypertension</td>
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<td>Hypertensive encephalopathy</td>
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<td>Hypertensive retinopathy</td>
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<td>----------------------------</td>
</tr>
<tr>
<td>Nephrotic syndrome</td>
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<tr>
<td>Nephritic syndrome</td>
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<tr>
<td>Rapidly progressive glomerulonephritis</td>
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<tr>
<td>AKI</td>
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<td>CKD</td>
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CKD: Chronic kidney disease, AKI: Acute kidney injury

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<th>Table 3: Biopsy finding</th>
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<td>Biopsy findings</td>
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<td>M0</td>
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<td>T2</td>
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<tr>
<td>Crescents</td>
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<td>Vascular thickening</td>
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and 11 (40.7%) patients, respectively. Tubular atrophy and interstitial fibrosis score of T1 and T2 was noted in 10 (37.3%) and 12 (44.4%), respectively. Crescents were noted in 4 (14.8%). Vessel wall thickening was present in 7 (25.9%).

Renal biopsy tissues were also studied with immunofluorescence staining for IgA, IgM, IgG, C3, and C1q showed IgA + C3 in 13 (48.1%), IgA + C3 + IgM in 10 (37.3%), IgA + C3 + IgM + IgG in 4 (14.8%), and IgA + C3 + IgM + C1q in 2 (7.4%) (Table 4).

Among the 27 patients, 18 (66.6%) were presented with renal failure at presentation. Mean age in who presented with renal failure at presentation was 27.9 years. Male dominated as 13 (72%). Hypertension was noted in 11 (61%). Macrohematuria occurred in seven (38%). Nephrotic range of proteinuria was present in eight (44%).

Renal biopsy showed mesangial hypercellularity (M1) in 15 (83%), endothelial proliferation (E1) was seen in 10 (56%), segmental score (S1) noted in 50%, tubular atrophy/interstitial fibrosis score T1 and T2 was noted in eight (44%) and nine (50%), respectively. Crescents were noted in four (22%). Vessel wall thickening was noted in four. Various factors which were studied between those who presented with renal failure at presentation (GFR <60 ml/min) and those without renal failure at presentation were tabulated in Table 5.

Eight (29.6%) were progressed to chronic kidney disease (CKD) (GFR <60 ml/min) on follow-up period. Mean age was 32.6. 64% were male. Macrohematuria was presented in five (63%). Hypertension persisted in five (63%). Response to proteinuria was assessed by those achieved complete remission (proteinuria <300 mg/day), partial remission (proteinuria 300-3000 mg/day), and nil remission (proteinuria >3000 mg/day). Three patients (37.5%) never attained remission. One attained complete remission. Four (50%) attained partial remission. Mesangial hypercellularity was noted in 6 (75%). Five presented with endothelial hypercellularity (62.5%). Segmental sclerosis was observed in five (62.5%). Four patients (50%) showed tubular atrophy and interstitial fibrosis. Crescents were noted in two (25%). 7 (87.5%) had GFR <60 ml/min/1.73 m² since presentation.

19 (70.4%) had normal renal function at the end of follow-up period. Mean age was 28. Macrohematuria was present in nine (47.3%). Eight had hypertension (42%). Nine patients had complete remission (47%) another seven attained partial remission (36.8%). Three never attained remission. Crescents were noted in three (15.7%). 12 (63.1%) had GFR <60 ml/min at their presentation in Table 6.

Of the nine patients presented with nephrotic syndrome, all were started with angiotensin-converting enzyme inhibitor titrated to reduce the blood pressure target of 125/75 mm Hg, eight were started with steroids. Four (50%) had partial remission. 1 (12.5%) had complete remission. 3 (37.5%) never

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<th>Table 4: IF finding</th>
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<tr>
<td><strong>IF finding</strong></td>
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<tr>
<td>IgA+C3</td>
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<tr>
<td>IgA+C3+IgM</td>
</tr>
<tr>
<td>IgA+C3+IgM+IgG</td>
</tr>
<tr>
<td>IgA+C3+IgM+C1q</td>
</tr>
</tbody>
</table>

IF: Immunofluorescence

<table>
<thead>
<tr>
<th>Table 5: Variables determining renal failure at presentation</th>
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</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>Mean age</td>
</tr>
<tr>
<td>Sex - M:F (%)</td>
</tr>
<tr>
<td>Hypertension (%)</td>
</tr>
<tr>
<td>Macrohematuria (%)</td>
</tr>
<tr>
<td>PCR&gt;3 g (%)</td>
</tr>
<tr>
<td>M0 (%)</td>
</tr>
<tr>
<td>M1 (%)</td>
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<tr>
<td>E0 (%)</td>
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<tr>
<td>E1 (%)</td>
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<td>S0 (%)</td>
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<td>S1 (%)</td>
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<td>T0 (%)</td>
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<tr>
<td>T1 (%)</td>
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<tr>
<td>T2 (%)</td>
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<tr>
<td>Crescents (%)</td>
</tr>
<tr>
<td>Vascular thickening (%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 6: Variables analyzed in the progression of CKD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>Mean age</td>
</tr>
<tr>
<td>Sex - M:F (%)</td>
</tr>
<tr>
<td>Hypertension (%)</td>
</tr>
<tr>
<td>Macrohematuria (%)</td>
</tr>
<tr>
<td>Response to proteinuria CR (%)</td>
</tr>
<tr>
<td>Partial response (%)</td>
</tr>
<tr>
<td>No response (%)</td>
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<tr>
<td>M1 (%)</td>
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<tr>
<td>E1 (%)</td>
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<tr>
<td>S1 (%)</td>
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<tr>
<td>T0 (%)</td>
</tr>
<tr>
<td>T1 (%)</td>
</tr>
<tr>
<td>T2 (%)</td>
</tr>
<tr>
<td>Crescents (%)</td>
</tr>
<tr>
<td>GFR &lt;60 ml/min at present (%)</td>
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<tr>
<td>Vessel wall thickening (%)</td>
</tr>
</tbody>
</table>

CKD: Chronic kidney disease
attained remission. 3 patients who attained complete remission retained their renal function. Of the five who had partial and nil remission, three patients progressed to CKD.

Of the 4 patients presented with rapidly proliferative glomerulonephritis, steroid and cyclophosphamide was given in as per vasculitis protocol. Half of them progressed to CKD, half were not. AKI was noted in 2 patients. One had crescent and one with no discernible findings.

**DISCUSSION**

Of the 27 biopsy proven IgAN, 17 were male. Male:Female ratio in our study was 1.7:1 which was comparable to Chaco et al. with M:F ratio 1.85:1. Mean age at presentation in our study was 27.3 years compared to Mittal et al. had a mean age of 29.9 years, and Muthukumar et al. showed mean age of 25.7 years but a decade younger than that quoted in the western world. The majority were in 10-29 years (66%).

11 (40.7%) patients presented with the macrohematuria. Chandrika et al., documented 49.3% had the same. Hypertension was noted in 16 patients (59.3%). Hypertensive retinopathy was noted in 7 patients (25.9%). Muthukumar et al. documented 21.4% had malignant hypertension.

Chandrika et al. documented 36.7%. Muthukumar et al. documented 25.5% had nephrotic syndrome. Mittal et al. study showed 23.1% had nephrotic syndrome. In our study, 33% had nephrotic syndrome. RPGN was noted in 14.8% patients. Muthukumar et al. documented 21% with RPGN. AKI was present in 7.4% patients compared to Muthukumar et al. (Table 7).

Renal biopsy results of the 27 patients revealed mesangial hypercellularity (M score >0.5) in 70.3%. Endocapillary proliferation was noted in 51.8%. Sclerosis score (S1) was noted in 40.8%. Tubular atrophy/interstitial fibrosis score (T1 and T2) was 37.3% and 44.4% (Table 8). In our study, arterial score was 25.9%.

Immunofluorescence study of renal biopsy tissue in our study showed IgA + C3 present in 13 (48.1%), IgA + C3 + IgM in 10 (37.3%), IgA + C3 + IgM + IgG in 4 (14.8%), and IgA + C3 + IgM + C1q in 2 (7.4%). Chandrika et al. showed IgA + C3 present in 105 (46.25%), IgA + C3 + IgM in 80 (35.24%), IgA + C3 + IgM + Immunoglobulin G in 20 (8.82%) and IgA + C3 + IgM + C1q in 5 patients (2.20%). In their study, full house pattern was noted in 4 (1.76%), but not in our study.

In our study, renal failure at presentation (GFR <60 ml/min) was noted in 18 (66.6%). Muthukumar et al. showed 61% had renal failure at diagnosis. The mean age was 27.9 years in who presented with renal failure at diagnosis. 13 (72%) patients were male, which was comparable to Muthukumar et al. (70%). Hypertension was noted in 11 (61%). Macrohematuria was noted in 7 (38%), the nephrotic range of proteinuria was present in 8 (44%).

Of the 18 patients who presented with renal failure at presentation, 83% had the mesangial score (M >0.5), 44% had Endocapillary proliferation, and 50% had sclerosis score (S1). Tubular atrophy/interstitial fibrosis score (T1 and T2) was noted in 44.4% and 51.1%, respectively. Crescents were noted in 22% of the above cohort. Muthukumar et al. showed interstitial fibrosis in 90% of patients and crescents in 16.7%.

The bivariate variables were analyzed using Chi-square fisher’s exact test. The multivariable was analyzed by multiple regressions. Male sex, mean age both had

**Table 7: Comparison of clinical presentation and syndrome**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Chandrika et al.</th>
<th>Mittal et al.</th>
<th>Muthukumar et al.</th>
<th>Present study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age years</td>
<td>30</td>
<td>29.9</td>
<td>25.7</td>
<td>27.3</td>
</tr>
<tr>
<td>M:F</td>
<td>1.5:1</td>
<td>3:1</td>
<td>-</td>
<td>1.7:1</td>
</tr>
<tr>
<td>Mean serum creatinine</td>
<td>2.2</td>
<td>3.1</td>
<td>-</td>
<td>2.03</td>
</tr>
<tr>
<td>Hematuria (%)</td>
<td>49.3</td>
<td>78.8</td>
<td>54.9</td>
<td>64</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>49</td>
<td>81</td>
<td>30</td>
<td>59.3</td>
</tr>
<tr>
<td>Nephrotic syndrome (%)</td>
<td>36.7</td>
<td>23.1</td>
<td>25.5</td>
<td>33</td>
</tr>
<tr>
<td>RPGN (%)</td>
<td>-</td>
<td>-</td>
<td>21.4</td>
<td>14.8</td>
</tr>
<tr>
<td>AKI (%)</td>
<td>11</td>
<td>-</td>
<td>4.1</td>
<td>7.4</td>
</tr>
</tbody>
</table>

**Table 8: MEST scoring in various studies**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Catran et al.</th>
<th>Mittal et al.</th>
<th>Nasri et al.</th>
<th>Our study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocapillary score (E1) (%)</td>
<td>42</td>
<td>24.4</td>
<td>32</td>
<td>51.8</td>
</tr>
<tr>
<td>Sclerosis score (S1) (%)</td>
<td>76</td>
<td>48.6</td>
<td>62</td>
<td>40.7</td>
</tr>
<tr>
<td>Tubular atrophy/interstitial fibrosis score in (T1 and T2) (%)</td>
<td>88</td>
<td>73.96</td>
<td>80</td>
<td>81.7</td>
</tr>
</tbody>
</table>

RPGN: Rapidly progressive glomerulonephritis, AKI: Acute kidney injury.
no significant correlation in those with renal failure at presentation. Hypertension, macrohematuria, and proteinuria >3 g/day were had no significant correlation in this cohort. Mesangial hypercellularity (M score >0.5), tubular atrophy/interstitial fibrosis score (T1 and T2), were significantly associated with renal failure at presentation. Crescents had no significant statistical association. There is no statistical association between vessel wall thickening and those with renal failure at presentation.

Muthukumar et al. showed that there were no significant correlation between male, hypertension, macrohematuria, and proteinuria >3 g/day in those who presented with renal failure at presentation. They showed interstitial fibrosis, vessel wall thickening were associated with renal failure at presentation. By multivariate analysis they showed only interstitial fibrosis was associated with renal failure at presentation, but not vessel wall thickening. Treatment response in nephrotic syndrome.

In our study, 33% presented with nephrotic syndrome all of them are started with angiotensin-converting enzyme inhibitors, and BP was titrated to 120/75 mmHg. Steroid was started in eight of them, 1 (12.5%) attained complete remission, 4 (50%) had partial remission, and 3 (37.5%) had no remission. Seven patients with partial and nil remission, five of them progressed to renal failure, two were not, but statistically not significant (P = 0.54). Reich et al. showed those who had sustained proteinuria >3 g/day had 25-fold faster declines in renal function.

In our study during follow-up period, 8 patients (29.6%) progressed to CKD. Mean age was 32.6 years. 63% of them had macrohematuria. Hypertension persisted in five (63%). There is no statistical significance noted for hypertension and macrohematuria. Those progressed to CKD three (37.5%) had proteinuria >3 g/day (nil remission), four (50%) had proteinuria in the range of 0.3-3 g/day (partial remission), one (12.5%) had urinary protein of <0.3 g/day. There was statistical significance noted for who had no response to the reduction in proteinuria with that progressed to CKD.

There was no statistical significance noted for the mesangial score (M1) in 75% and endocapillary proliferation 62.5% of patients in those who progressed to CKD. Segmental score (S1) was noted in 62.5% who progressed to CKD, which was statistically significant. Tubular atrophy/interstitial fibrosis score (T1 and T2) was noted in 50% of each who progressed to CKD, which was not statistically significant. 28% had crescents which were not statistically significant. There is no statistical association between vascular wall thickening and CKD progression.

**CONCLUSION**

Nephrotic syndrome is the most common clinical presentation in IgAN. The majority presented with renal failure at entry into the study. Severe MEST scoring was significantly associated with renal failure at presentation. Non-responders of proteinuria and those who had severe S in MEST scoring system progressed to CKD. Crescents had no statistical association for progression to CKD. Complete or partial remission of proteinuria had less chance for the progression to CKD.

**REFERENCES**

Profile of Mineral Bone Disease in Chronic Kidney Disease Patients in a Tertiary Care Center

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Abstract

Introduction: Chronic kidney disease related-mineral bone disorder (CKD-MBD) has been poorly studied in pre-dialysis Indian CKD patients.

Aim: The aim of the study is to study the clinical, mineral abnormalities in Stage 3-5 CKD patients.

Materials and Methods: A hospital-based cross-sectional survey including, demographic profile, history of CKD-MBD symptoms, measurement of serum calcium, intact parathyroid hormone (iPTH), magnesium, phosphorus, and Vitamin D bone alkaline phosphatase (BAP) in Stage 3-5 CKD patients.

Results: Of 83 patients, prevalence of Vitamin D deficiency in Stage 3-5 CKD is 9.64%. The overall prevalence of low BAP, normal BAP, and high BAP in Stage 3-5 CKD is 3.61%, 74.70%, and 21.69%, respectively, was not statistically significant.

Conclusion: Vitamin D deficiency is noted in earlier stages of CKD rather than late stages. BAP had statistically significant correlation with calcium, Vitamin D, and iPTH. Serum bone specific alkaline phosphatase assay should be included in CKD-MBD screening. The screening should begin in the early stage of CKD.

Key words: Chronic kidney disease related-mineral bone disorder, Valvular calcification, Vitamin D

INTRODUCTION

Chronic kidney disease (CKD) is now a public health problem affecting an estimated 10-13% of the world population.¹,² As renal function declines, there is a progressive impairment in the regulation of mineral homeostasis leading to altered serum concentrations of calcium, phosphate, parathyroid hormone (PTH), and Vitamin D. The end result of these biochemical abnormalities is disordered bone growth and remodeling and extraskeletal calcification; collectively known as CKD related-mineral bone disorders (CKD-MBD). CKD is associated with significant perturbations in bone and mineral metabolism, leading to altered serum concentrations of calcium, phosphorus, PTH, and Vitamin D with abnormalities in bone remodeling, renal osteodystrophy, and extraskeletal calcification.³ These changes can be detected as early as when the estimated glomerular filtration rate (eGFR) falls to ≤60 mL/min/1.73 m² body surface area. Early detection and management of CKD-MBD is important as it is associated with increased cardiovascular mortality due to associated increased risk of soft tissue, vascular, and cardiac valvular calcification.⁴,⁶ Spectrum of CKD-MBD has been poorly studied in Indian CKD patients, especially in the pre-dialysis stage.

Aim

The aim of the study is to study the clinical, mineral abnormalities in Stage 3-5 CKD patients.

MATERIALS AND METHODS

This cross-sectional survey was conducted at the Department of Nephrology, Government Kilpauk Medical College, Chennai, Tamil Nadu. Patients with newly
diagnosed Stage 3-5 CKD (based on history, eGFR of <30 mL/min/1.73 m² by the abbreviated modification of diet in renal disease formula, biochemical, and ultrasonographic/histological evidence of CKD) who were not yet on dialysis or on hemodialysis/CAPD for <1 month at the time of enrolment in the study. Exclusion criteria include: Those who were already on dialysis, had pre-existing parathyroid abnormalities, already on non-steroidal anti-inflammatory drug, antiepileptics known liver diseases, rickets, osteomalacia patients, were excluded from the study. Renal transplant patient was also excluded from the study.

Ethics committee approval from the institutional ethics committee was obtained before the study. Questionnaire regarding symptoms of CKD-MBD is given to all the patients in our study. Those who are having one or more of the symptoms are considered as symptomatic. Ophthalmic fundus examination is done. After obtaining consent from the patient, with aseptic precautions, about 8 ml of venous blood is obtained from the median cubital vein. Serum and plasma samples are stored at −20°C ice lined refrigerator. Plasma samples are analyzed for 25-hydroxy Vitamin D and intact PTH (iPTH). Serum samples are analyzed for all other biochemical parameters.

RESULTS

Of the total 83 patients, slight female predominance with 42 (56%), the M:F ratio is 0.9:1. The average age of the CKD patients in our study is 54.3 years. 34% of patients in CKD Stage 4 followed by Stage 3 and 5. 59.03% of are asymptomatic. The serum total calcium observed is corrected for serum albumin. The prevalence of calcium abnormalities is shown in Table 1.

In our study, we had 25, 34, and 24 Stage 3, 4, and 5 CKD patients. The normal value of serum calcium is 8.6-10 mg/dl. The prevalence of hypocalcaemia in Stage 3, 4, and 5 are 12%, 11.6%, and 37.5%, respectively. The prevalence of normocalcaemia in Stage 3, 4, and 5 CKD are 76%, 79.41%, and 58.33%, respectively. The prevalence of hypercalcemia in Stage 3, 4, and 5 CKD are 12%, 8.82%, and 4.17%, respectively. The overall prevalence of hypocalcaemia, normocalcaemia, and hypercalcemia in Stage 3-5 CKD is 19.28%, 72.29%, and 8.43%, respectively, which is not statistically significant.

The prevalence of hypoparathyroidism in Stage 3, 4, and 5 are 12%, 2.94%, and 4.17%, respectively, normoparathyroidism in Stage 3, 4, and 5 CKD are 36%, 38.24%, and 8.33%, respectively, hyperparathyroidism in Stage 3, 4 and, 5 CKD are 52%, 58.82%, and 87.5%, respectively. The overall prevalence of hypoparathyroidism, normoparathyroidism, and hyperparathyroidism in Stage 3-5 CKD is 6.02%, 28.92%, and 65.06%, respectively, which is statistically significant (Table 2).

The prevalence of Vitamin D deficiency in Stage 3, 4, and 5 are 4%, 20.59%, and 0%, respectively. The prevalence of no deficiency of Vitamin D in Stage 3, 4, and 5 CKD are 96%, 79.41%, and 100%, respectively. The overall prevalence of Vitamin D deficiency and no deficiency in Stage 3-5 CKD is 9.64% and 90.36%, respectively, which is statistically significant (Table 3).

The prevalence of hypermagnesemia in Stage 3, 4, and 5 are 16%, 28%, and 56%, respectively, normomagnesemia in Stage 3, 4, and 5 CKD are 17.65%, 47.06%, and 35.29%, respectively, hypermagnesemia in Stage 3, 4, and 5 CKD are 20.83%, 41.67%, and 37.50%, respectively. The overall prevalence of hypomagnesaemia, normoagnesemia, and hypermagnesaemia in Stage 3-5 CKD is 18.07%, 39.76%, and 42.17%, respectively, had no significance (Table 4).

| Table 1: Distribution of calcium abnormalities in study patients |
|-----------------|-----------------|-----------------|
| Calcium         | eGFR            | Number of cases (%) |
|                 | stage 3 (%)     | stage 4 (%)     | stage 5 (%)     | total (%)     |
| BN              | 3 (12)          | 4 (11.76)       | 9 (37.5)        | 16 (19.28)    |
| N               | 19 (76)         | 27 (79.41)      | 14 (58.33)      | 60 (72.29)    |
| AN              | 3 (12)          | 3 (8.82)        | 1 (4.17)        | 7 (8.43)      |
| Total           | 25 (100)        | 34 (100)        | 24 (100)        | 83 (100)      |

| Table 2: Distribution of iPTH abnormalities in study patients |
|-----------------|-----------------|
| iPTH            | eGFR            |
|                 | stage 3 (%)     | stage 4 (%)     | stage 5 (%)     | total (%)     |
| BN              | 3 (12)          | 1 (2.94)        | 1 (4.17)        | 5 (6.02)      |
| N               | 9 (36)          | 13 (38.24)      | 2 (8.33)        | 24 (28.92)    |
| AN              | 13 (52)         | 20 (58.82)      | 21 (87.5)       | 54 (65.06)    |
| Total           | 25 (100)        | 34 (100)        | 24 (100)        | 83 (100)      |

| Table 3: Distribution of Vitamin D abnormalities in study patients |
|-----------------|-----------------|
| Vitamin D       | eGFR            |
|                 | stage 3 (%)     | stage 4 (%)     | stage 5 (%)     | total (%)     |
| Non deficient   | 24 (96)         | 27 (79.41)      | 24 (100)        | 75 (90.36)    |
| Deficient       | 1 (4)           | 7 (20.59)       | 0 (0)           | 8 (9.64)      |
| Total           | 25 (100)        | 34 (100)        | 24 (100)        | 83 (100)      |
The prevalence of hypophosphatemia in Stage 3, 4, and 5 are 20%, 8.82%, and 0%, respectively, normophosphatemia in Stage 3, 4, and 5 CKD are 76%, 73.53%, and 50%, respectively, hyperphosphatemia in Stage 3, 4, and 5 CKD are 4%, 17.65%, and 50%, respectively. The overall prevalence of hypophosphatemia, normophosphatemia, and hyperphosphatemia in stage 3-5 CKD is 9.64%, 67.47%, and 22.89%, respectively, has significance (Table 5).

The prevalence of low bone alkaline phosphatase (BAP) in Stage 3, 4, and 5 are 8%, 0% and 4.17%, respectively, normal BAP in Stage 3, 4, and 5 CKD are 84%, 70.59%, and 70.83%, respectively, high BAP in Stage 3, 4, and 5 CKD are 8%, 29.41%, and 25%, respectively. The overall prevalence of low BAP, normal BAP, and high BAP in Stage 3-5 CKD is 3.61%, 74.70%, and 21.69%, respectively, which has statistically no significance (Table 6).

The prevalence of abnormal bone turnover marker BAP in symptomatic and asymptomatic CKD-MBD patients is as follows.

The difference in bone turnover marker in Stage 3-5 CKD in asymptomatic and symptomatic MBD patients is statistically not significant (Table 7). A positive correlation is seen between BAP and Vitamin D and it is statistically significant. There is a positive correlation between BAP and iPTH with a Pearson correlation of 0.34 which is statistically significant. The iPTH and Vitamin D are inversely correlated but this correlation is not statistically significant. iPTH and calcium are found to be negatively correlated, i.e., when calcium falls iPTH rises and the reverse occurs in hypercalcemia. The parathormone is a minute-to-minute compensatory response of the body to the fall in serum ionized calcium levels. Hence, this correlation is strong.

DISCUSSION

The prevalence of CKD in our Indian population is estimated around 0.78% and 0.87%.

We studied 83 CKD stage 3-5 patients. The average age of the CKD patients in our study is 54.3 ±12.67 years. Of them, 42 were females and 41 males leading to a slight female predominance, the M:F ratio is 0.9:1. The symptomatic CKD-MBD individuals comprised 40.96%. Remaining 59.03% did not have any symptoms related to CKD-MBD. The prevalence of hypoparathyroidism is 6.02% indicating the possible load of low turnover bone disease, whereas hyperparathyroidism, with a cutoff of iPTH >65 pg/ml, is noted in 58.82% in Stage 4 and 87.5% in Stage 5, with overall 65.06% indicating high turnover bone disease. Other Indian studies show hyperparathyroidism to be 73%, 57.3% in Stage 4 CKD and 89.5% in Stage 5 CKD and 84.62% in Stage 4 and 88.29% in Stage 5. High turnover state assessed by Jabbar et al. is 60%.

### Table 4: Distribution of magnesium abnormalities in study patients

<table>
<thead>
<tr>
<th>Magnesium</th>
<th>eGFR</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>4 (16)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>7 (28)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>14 (56)</td>
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<td>Total</td>
<td>25 (100)</td>
<td></td>
</tr>
<tr>
<td>Stage 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>6 (17.65)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>16 (47.0)</td>
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<td>AN</td>
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</tr>
<tr>
<td>Stage 5</td>
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</tr>
<tr>
<td>BN</td>
<td>5 (20.83)</td>
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</tr>
<tr>
<td>N</td>
<td>10 (41.67)</td>
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<tr>
<td>AN</td>
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<td>Total</td>
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</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>15 (18.07)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>33 (39.76)</td>
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</tr>
<tr>
<td>AN</td>
<td>35 (42.17)</td>
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<tr>
<td>Total</td>
<td>83 (100)</td>
<td></td>
</tr>
</tbody>
</table>

eGFR: Estimated glomerular filtration rate, BN: Below normal, N: Normal, AN: Above normal

### Table 5: Distribution of phosphorus abnormalities in study patients

<table>
<thead>
<tr>
<th>Phosphorus</th>
<th>eGFR</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 3</td>
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<td></td>
</tr>
<tr>
<td>BN</td>
<td>5 (20)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>19 (76)</td>
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<tr>
<td>AN</td>
<td>1 (4)</td>
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<td>Total</td>
<td>25 (100)</td>
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</tr>
<tr>
<td>Stage 4</td>
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</tr>
<tr>
<td>BN</td>
<td>3 (8.82)</td>
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</tr>
<tr>
<td>N</td>
<td>25 (73.53)</td>
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<tr>
<td>AN</td>
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<td>Total</td>
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<tr>
<td>Stage 5</td>
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<tr>
<td>BN</td>
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<td>24 (100)</td>
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<td>Total</td>
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</tr>
<tr>
<td>BN</td>
<td>6 (9.64)</td>
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</tr>
<tr>
<td>N</td>
<td>56 (74.47)</td>
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<td>AN</td>
<td>19 (22.89)</td>
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<tr>
<td>Total</td>
<td>83 (100)</td>
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</tbody>
</table>

eGFR: Estimated glomerular filtration rate, BN: Below normal, N: Normal, AN: Above normal

### Table 6: Distribution of abnormal BAP in study patients

<table>
<thead>
<tr>
<th>BAP</th>
<th>eGFR</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>2 (8)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>21 (84)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>2 (8)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>25 (100)</td>
<td></td>
</tr>
<tr>
<td>Stage 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>24 (70.59)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>10 (29.41)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (100)</td>
<td></td>
</tr>
<tr>
<td>Stage 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>1 (4.17)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>17 (70.83)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>6 (25)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>24 (100)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>3 (3.61)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>62 (74.7)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>18 (21.69)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>83 (100)</td>
<td></td>
</tr>
</tbody>
</table>

eGFR: Estimated glomerular filtration rate, BAP: Bone alkaline phosphatase, BN: Below normal, N: Normal, AN: Above normal

### Table 7: Distribution of abnormal bone turnover marker BAP in symptomatic and asymptomatic CKD-MBD patients

<table>
<thead>
<tr>
<th>BAP</th>
<th>eGFR</th>
<th>Number of cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>2 (4.08)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>36 (73.47)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>11 (22.45)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49 (100)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>1 (2.94)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>26 (76.47)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>7 (20.57)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (100)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>3 (3.61)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>62 (74.7)</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>18 (21.69)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>83 (100)</td>
<td></td>
</tr>
</tbody>
</table>

eGFR: Estimated glomerular filtration rate, CKD-MBD: Chronic kidney disease related-mineral bone disorder, BAP: Bone alkaline phosphatase, BN: Below normal, N: Normal, AN: Above normal
CONCLUSION

Vitamin D deficiency is noted in earlier stages of CKD rather than late stages. BAP had statistically significant correlation with calcium, Vitamin D, and iPTH. Serum bone specific alkaline phosphatase assay should be included in CKD-MBD screening. The screening should begin in the early stage of CKD.

REFERENCES

Bolus Doses of Ketofol versus Dexmedetomidine for the Prevention of Emergence Agitation in Children: A Prospective Randomized Controlled Clinical Trial

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INTRODUCTION

Emergency agitation in children is a common problem with sevoflurane anesthesia which includes phenomena such as crying, excitation, agitation, delirium, and behavioral disturbances during early emergence from general anesthesia.¹ This phenomenon must be prevented by providing smooth emergence to pediatric patients. Otherwise, an irritable, uncooperative, inconsolable, and crying child with excessive motor activity may pose a significant problem to the parents and nursing personal to control and children may also harm themselves.²

High incidence of emergency agitation has given way to researchers to come up with numerous studies evaluating the incidence and severity of emergence agitation such as crying, excitation, agitation, delirium, and behavioral disturbances during early emergence from general anesthesia.¹

Abstract

Background: Emergency agitation in children is a common problem with sevoflurane anesthesia which includes phenomena such as crying, excitation, agitation, delirium, and behavioral disturbances during early emergence from general anesthesia.

Materials and Methods: After the institutional ethics committee approval and written informed consent, 75 children aged 3-10 years, belonging to ASA I and II posted for oropharyngeal and urological surgeries, were randomly allocated for this randomized controlled study. Children were randomly assigned into three groups of 25 each into NS (control), KF (ketofol, k-0.25 mg/kg, p-1 mg/kg), and D (dexmedetomidine 0.3 ug/kg) groups. All the study drugs were administered 10 min before the end of surgery in the respective groups. In the post-anesthetic care unit (PACU), all children were evaluated for emergence agitation with modified objective pain scale (MOPS) and pediatric anesthesia emergency delirium scale (PAED) scores at 0, 10, 20, and 30 min, respectively. Hemodynamics and other side effects were monitored in the PACU. When all the children satisfied discharge criteria, they were shifted to the ward.

Results: The incidence and severity of emergence delirium were significantly high in the control group when compared to ketofol and dexmedetomidine groups according to MOPS and PAED scores at 0, 10, 20, and 30 min time intervals at PACU. Emergence agitation reduction was comparable between ketofol and dexmedetomidine groups, the difference being that in dexmedetomidine group, all the children satisfied discharge criteria earlier than ketofol group, and they appeared to be calm and cooperative while children of ketofol group were mildly restless. However, the difference between KF and D groups was not statistically significant.

Conclusion: Dexmedetomidine and ketofol caused a significant reduction in the incidence and severity of emergence agitation when compared to control group. Ketofol was as effective as dexmedetomidine in the prevention of emergence agitation when administered before the end of surgery, but children administered dexmedetomidine were calm and satisfied discharge criteria earlier than ketofol.

Key words: Dexmedetomidine, Emergence agitation, Emergence delirium, Ketamine, Propofol, Ketofol
with inhalational and intravenous anesthetic agents.\textsuperscript{3,4} Parental presence at emergence, physical restraints, or pharmacologic interventions are the methods used to prevent emergence agitation. Various studies proved that medications such as fentanyl, ketamine propofol, ketofol, dexmedetomidine, clonidine, and midazolam have been used with differing efficacies of individual agents.\textsuperscript{5,6} This study aims to compare the efficacy of dexmedetomidine versus ketofol for the prevention of emergence agitation in children under sevoflurane-based anesthesia.

**MATERIALS AND METHODS**

After the institutional ethics committee approval and written informed consent, children aged between 3 and 10 years belonging to ASA Grade I and II were randomly selected for this prospective, randomized, controlled, and double-blinded study which was conducted in a tertiary care hospital from June 2016 to December 2016.

**Inclusion Criteria**

Male and female gender and children aged between 3 and 10 years belonging to ASA: I and II surgeries: Oropharyngeal and urological procedures were included in the study.

**Exclusion Criteria**

- Uncooperative children
- Children with neuropsychiatric disorders
- Children with chronic sedative medication
- Children with difficult airway
- Children with mental retardation
- Children with BMI > 18.5 kg/m\textsuperscript{2}.

Children were randomly divided into three groups of 25 each using computer-generated random number table.

- Group NS: Were assigned to 10 cc of normal saline, 10 min before the end of surgery.
- Group KF: Were assigned to receive a combination of ketamine 0.25 mg/kg and propofol 1 mg/kg (ketofol) in a single syringe, the total volume made up to 10 ml.
- Group D: Were assigned to receive 0.3 \textmu g/kg of dexmedetomidine, the total volume made up to 10 ml to ensure blinding.

All the children were premedicated with oral midazolam 0.25 mg/kg 25 min before surgery. Standard GA regimen was administered in all the children comprising of injection glycopyrrolate 20 \textmu g/kg IV, ondansetron 0.1 mg/kg IV, injection fentanyl 1 \textmu g/kg IV, injection thiopentone 5-6 mg/kg IV, and injection atracurium 0.5 mg/kg IV for intubation with O\textsubscript{2}:N\textsubscript{2}O @ 40\%:60\% and sevoflurane @ 1.5-2\% for maintenance titrated to hemodynamic stability. Children below 20 kg were ventilated with Jackson-Rees’ modification of Ayer’s T-piece and children > 20 kg were ventilated with Bain’s circuit.

The principal investigator is the anesthesiologist who loaded all the syringes with the study drugs and prepared them in wrapped aluminum foils and closed envelopes which were provided to another investigator just before administering them to the children. Monitoring and data collection were done by a junior resident who was unaware of the study drugs and allocation.

On arrival at the operating room, standard monitors were applied to every child. Baseline heart rate (HR), respiratory rate, non-invasive blood pressure (NIBP), temperature, electrocardiogram, and Spo\textsubscript{2} were recorded. After securing appropriate IV cannula, all the children were anesthetized with standard GA regimen as mentioned. All the children were ventilated to maintain an ETCO\textsubscript{2} of 30-35 mmHg.

Reversal of neuromuscular blockade was done with glycopyrrolate 20 \textmu g/kg IV and neostigmine 0.7 mg/kg IV on the attainment of signs of reversal. All the study drugs were administered to the children by anesthetist who was unaware of the group allocation, 10 min before the completion of surgery and after discontinuation of sevoflurane. Children were extubated after criteria for extubation was attained.

After extubation children were shifted to post-anesthetic care unit (PACU) and monitored for the following parameters until they were shifted to the ward.

- Hemodynamic parameters: HR, NIBP, and Spo\textsubscript{2}.
- Modified objective pain scale (MOPS) scores: Were assessed immediately after extubation and 10 min intervals thereafter in the PACU until they were discharged to the ward. MOPS is intended to evaluate post-operative pain with minimum score 0 and maximum score 10 (represented in Table 1).

**Table 1: Modified objective pain score**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crying</td>
<td>No crying</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Crying but responds to tender loving care</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Crying not responding to tender loving care</td>
<td>2</td>
</tr>
<tr>
<td>Movement</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Restlessness</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Thrashing</td>
<td>2</td>
</tr>
<tr>
<td>Agitation</td>
<td>Asleep/calm</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Hysterical</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MOPS score &gt;3</td>
<td>Rescue analgesia required</td>
</tr>
</tbody>
</table>

MOPS: Modified objective pain scale
The severity of emergence delirium was evaluated using pediatric anesthesia emergency delirium scale (PAED) with scores ranging from 0 to 20. PAED scale was monitored immediately after emergence and at 10 min intervals thereafter until discharge from PACU (represented in Table 2).

- Adverse reactions at the time of emergence such as nausea, vomiting, laryngospasm, bronchospasm, respiratory depression, desaturation, and bradycardia were noted.
- Emergence time: Time from discontinuation of anesthetic until time to eye opening.
- Duration of sevoflurane anesthesia: Time from the start of sevoflurane for maintenance until the discontinuation of sevoflurane before the end of surgery.
- Time to discharge: Time since arrival at PACU until discharge from PACU to ward.
- Children were monitored in the PACU for all the above parameters until discharge and discharged from the PACU after satisfying the below criteria for discharge.

Criteria for discharge:
1. Fully awake
2. Calm
3. Stable hemodynamics
4. PAED scale < 10
5. MOPS ≤ 3
6. Oxygen saturation > 92% on room air.

Statistical analysis
Statistical analysis was done with software vassarstats.com. Demographic data were analyzed using Fisher’s exact test. Categorical data were analyzed using t-test followed by ANOVA. Data were expressed as mean ± standard deviation, percentage, and absolute numbers. P < 0.05 was considered statistically significant.

RESULTS

All the patients who were enrolled in the study completed the study. The three groups were comparable with respect to demographic characters as represented in Table 2. The three groups were comparable with respect to demographic characters as represented in Table 3. High-risk surgeries for emergency agitation such as oropharyngeal and genitourinary procedures were included in this study as mentioned in Table 4.

Intraoperative hemodynamics were comparable in both the groups throughout the surgery, but mean HRs were higher in the control group after extubation and during the immediate recovery period in the PACU when compared with ketofol and dexmedetomidine groups, P < 0.001, as shown in Figure 1. With respect to recovery characteristics such as the duration of surgery, duration of sevoflurane anesthesia, and emergence time, all the three groups were comparable, P > 0.05, as represented in Table 5.

Time to discharge was significantly less in dexmedetomidine group compared to ketofol group and significantly less in ketofol group compared to control group, P < 0.01, as represented in Table 5. Mean PAED scores were significantly low at arrival, at 10 min, at 20 min, and at 30 min stay at PACU in dexmedetomidine group and ketofol group compared to control group, P < 0.01, as represented in Figure 2.

When comparing ketofol and dexmedetomidine groups, the difference in mean PAED scores was clinically significant.

<table>
<thead>
<tr>
<th>Table 2: PAED score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
</tr>
<tr>
<td>Make eye contact with care giver</td>
</tr>
<tr>
<td>Actions are purposeful</td>
</tr>
<tr>
<td>Aware of surrounding</td>
</tr>
<tr>
<td>Restless</td>
</tr>
<tr>
<td>Inconsolable</td>
</tr>
</tbody>
</table>

• 1-calm, 2-not calm but could be easily consoled, 3-moderately agitated or restless and not easily calm, 4-combatve, excited and thrashing around. PAED: Pediatric emergency delirium scale

<table>
<thead>
<tr>
<th>Table 3: Demographic data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>M/F</td>
</tr>
<tr>
<td>Wt in kg</td>
</tr>
<tr>
<td>ASA 1/2</td>
</tr>
</tbody>
</table>

Data expressed as mean, SD, absolute numbers and ratio P>0.05, statistically not significant. SD: Standard deviation

<table>
<thead>
<tr>
<th>Table 4: Type of surgeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgeries</td>
</tr>
<tr>
<td>Tonsillectomies</td>
</tr>
<tr>
<td>Orchiopexy</td>
</tr>
<tr>
<td>Herniotomy</td>
</tr>
<tr>
<td>Hypospadias</td>
</tr>
<tr>
<td>Cleft palate</td>
</tr>
</tbody>
</table>

Data expressed as absolute numbers

<table>
<thead>
<tr>
<th>Table 5: Recovery characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time in min</td>
</tr>
<tr>
<td>Duration of surgery</td>
</tr>
<tr>
<td>Duration of anesthesia</td>
</tr>
<tr>
<td>Emergence time</td>
</tr>
<tr>
<td>Time to discharge</td>
</tr>
</tbody>
</table>

Data expressed as mean±SD. A P<0.05 was considered statistically significant. SD: Standard deviation
but statistically not significant at all these time intervals (mean scores were less in dexmedetomidine group than ketofol group) as represented in Figure 2. The incidence of emergence agitation according to MOPS score >3 and PAED score >10 immediately after emergence was significantly high in the control group, compared to ketofol group and dexmedetomidine group, \( P < 0.01 \), represented in Figure 3.

The incidence of emergence agitation was less in dexmedetomidine group (8%) compared to ketamine group (20%) but not statistically significant, \( P > 0.05 \), represented in Figure 3. MOPS scores were significantly high in the control group compared to ketofol and dexmedetomidine groups, \( P < 0.01 \), represented in Figure 4. After 10 min at PACU, MOPS scores were completely zero in the dexmedetomidine group.

12\% \( (n = 3) \) of patients in the control group had vomiting as a side effect, and 8\% \( (n = 2) \) in ketofol group had transient apnea immediately after extubation which responded to touch. No other side effects were observed in all the three groups.

**DISCUSSION**

Emergency agitation is defined as number of children with post-operative behavioral disturbances during emergence from sevoflurane anesthesia as measured by agitation scores mentioned in the study. Predisposing factors for emergency agitation include rapid emergence, intrinsic characteristic of the anesthetic, pre-operative pain and anxiety, preschool children, baseline temperament of the child, and the type of surgery. Otolaryngeal, ophthalmic, and genitourinary surgeries carry a high risk of emergence agitation. This study compares pharmacologic interventions aimed at treating pain and anxiety during emergence in pediatric patients posted for various surgeries under sevoflurane-based anesthesia.
This study demonstrates that dexmedetomidine and ketofol reduced the incidence and severity of emergence delirium effectively when compared to normal saline, and the effects of dexmedetomidine being much superior to ketofol.

Dexmedetomidine and ketofol (combination of ketamine and propofol) were preferred in this study because both of them produce sedation and pain relief and help to alleviate emergence agitation in children. Dexmedetomidine, a selective alpha 2 agonist has sedative, analgesic, and anxiolytic effects after IV administration.7

Isik et al. have shown that dexmedetomidine reduced the incidence of emergence agitation ranging between 4.8% and 17% with no hemodynamic effects after IV administration in doses between 0.3 and 1 ug/kg after induction of anesthesia.8 It is proved that α2 agonists decrease emergence agitation by their analgesia effect as well as by decreasing the anesthetic requirements.

Ketamine, a N-methyl-D-aspartate receptor antagonist, when given in low doses produces effective analgesia and also opioid-sparing effects.9 Propofol, an ultrashort acting induction agent, produces sedation in low doses, modifies emergence, and decreases emergence agitation depending on the time of administration.10 The combination of ketamine and propofol (ketofol) utilizes these two properties to decrease the incidence and severity of emergence agitation which is the rationale for administering this drug in this study. Ketofol also ensures hemodynamic stability along with post-operative analgesia, sedation, and good recovery profile while minimizing the side effects of both agents.11

Ali and Elshorbagy conducted a clinical trial on dexmedetomidine versus ketofol on the incidence of emergence agitation associated with sevoflurane anesthesia and concluded that ketofol (1 mg/kg, 0.25 mg/kg) was as effective as dexmedetomidine 0.3 ug/kg for prevention of emergence agitation but with better analgesic effect and with out delaying emergence.12

The results of this study well correlated with the Ali and Elshorbagy study, especially at the end of 30 min of PACU stay. At 10 and 20 min of PACU stay, dexmedetomidine was superior to ketofol as measured by MOPS and PAED scores, but at 30 min of PACU stay, dexmedetomidine is clinically superior to ketofol but statistically not significant with respect to PAED and MOPS scores (P > 0.05).

Dahmani et al., in their meta-analysis on emergence agitation, have shown that pain prevention, propofol, fentanyl, ketamine, and α2 agonists have preventive effects on emergence delirium while midazolam and serotonin inhibitors did not have a prophylactic effect.13

Patel et al. compared dexmedetomidine infusion versus IV fentanyl and concluded that dexmedetomidine infusion significantly reduced the post-operative opioid requirements and incidence and severity of emergence agitation in children undergoing tonsillectomies and adenoidectomies.14

Guler et al. showed that in dexmedetomidine group, the time to extubation and the time to discharge from PACU were prolonged compared to ketofol and control groups contrary to the current study where the time to extubation was comparable between all three groups, but time to discharge is significantly less in dexmedetomidine group than ketofol and control groups, where attenuation of pain and anxiety could be the factors responsible for early attainment of discharge criteria in dexmedetomidine group.15

Sikich and Lerman developed the PAED to assess the incidence and severity of emergence agitation by incorporating cognitive and agitation elements and proved its reliability and validity. Most of the studies used PAED score to assess emergence agitation16. In this study, we have used PAED score compounded with MOPS as assessment tools to emergence agitation.

Aouad et al. demonstrated that the threshold score for PAED score was 10 which was the best discriminator between presence and absence of emergence agitation (incidence).17

PAED score of > 16 and MOPS of > 3 at any point of time during the first 30 min of PACU stay represent severe agitation in this study.

The incidence of emergence agitation is significantly high in the control group compared to ketofol or dexmedetomidine group during children’s stay in the PACU until discharge in the current study. At the end of 30 min of PACU stay, the incidence is gradually decreased probably due to the weaning effect of sevoflurane. Fentanyl 1 ug/kg was administered as rescue agent to produce analgesia and sedation to all children whose has MOPS scale > 3 and PAED score > 10 after 30 min of PACU stay in this study. Children who had vomiting episode in the PACU were administered on dansetron 0.1 mg/kg IV.

Significant changes in the hemodynamics occurred after extubation in the control group when compared to ketofol and dexmedetomidine group which can be due to the sympathetic responses triggered by
immediate post-operative pain in the placebo group. The hemodynamics after extubation and during PACU stay were comparable between ketofol and dexmedetomidine group. Probably, the low doses of study drugs could be responsible for the hemodynamic stability in ketofol and dexmedetomidine groups.

Lack of validated uniform outcome scales as a tool to measure emergence agitation can be a limitation in this study. Effect of pain on children's behavior was a potential confounder in determining the outcome. There is a lot of scope for the future studies and interventions which should include control group and ensure that control group should be given adequate analgesia for which pain may be a confounding factor in the incidence of emergence agitation.

CONCLUSION

Dexmedetomidine (0.3 ug/kg) and ketofol (0.25 mg/kg and 1 mg/kg) caused a significant reduction in the incidence and severity of emergence agitation when compared to control group. Ketofol was as effective as dexmedetomidine in the prevention of emergence agitation when administered before the end of surgery, but children administered dexmedetomidine was calm and satisfied discharge criteria earlier than ketofol at this low dose.

REFERENCES


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Characterization of Focal Liver Lesions Using SonoVue, Contrast-enhanced Ultrasound

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Abstract

Introduction: Focal liver lesions are frequently discovered in daily practice owing to extensive use of imaging methods. Their nature must be elucidated for prognosis assessment and to decide on therapeutic strategy.

Aim: The aim of this article is to study the sonographic characterization of focal liver lesions can be improved using SonoVue®-enhancement.

Materials and Methods: This prospective study was conducted in 30 patients with focal liver lesions identified in conventional gray-scale ultrasound at Barnard Institute of Radiology, Madras Medical College.

Results: Out of total 30 cases, contrast-enhanced real-time ultrasonography (CEUS) identified 9 hepatocellular cancer (HCC) cases and 8 cases were confirmed by fine-needle aspiration cytology (FNAC) as HCC. Four cases of HCC were identified by both contrast-enhanced computed tomography (CECT) and conventional gray-scale ultrasonography (USG). Out of the 17 cases of metastatic deposits confirmed by FNAC CEUS, CECT and conventional gray-scale USG identified 16 (94%), 14 (82%), and 11 (65%) cases, respectively.

Conclusion: CEUS is a promising approach in the non-invasive characterization of focal liver lesions and can be useful as a first-line imaging technique clinically when a focal liver lesion is detectable on USG.

Key words: Contrast-enhanced ultrasound, Enhancement pattern, Focal liver lesions, Ultrasound contrast agents

INTRODUCTION

The characterization of focal liver lesions forms a key element in the majority of radiological practices. While B-mode imaging is useful for the identification of focal liver lesions, it is often difficult, even with the use of color Doppler, to accurately characterize a focal liver lesion.¹ Contrast-enhanced real-time ultrasonography (CEUS) is a promising approach in the non-invasive characterization of focal liver lesions and can be useful as a first-line imaging technique clinically when a focal liver lesion is detectable on ultrasonography (USG).² Microbubble CEUS utilizes ultrasound contrast agents (UCAs), which perform as blood pool tracers, have overcome the limitations of conventional B-mode and color or power Doppler ultrasound (US) and enable the display of parenchymal microvasculature.³ Depend on contrast agent and US-mode, the dynamic lesion enhancement pattern is visualized during intermittent or continuous sonation. Enhancement patterns are described during subsequent vascular phases (e.g. arterial, portal-venous, and late phase for liver lesions), similar to contrast-enhanced computer tomography (CECT) and/or contrast-enhanced magnetic resonance imaging (MRI).⁴ UCA remains in the intravascular space, whereas the majority of currently approved contrast agents for CT and MRI are rapidly cleared from the blood pool into the extracellular space. An inherent advantage of CEUS is the possibility to assess the contrast enhancement patterns in real time, without the necessity to redefine scan-time points or to perform bolus-tracking and the possibility to perform repeated examinations due to the excellent patient tolerance of UCA.⁵,⁷

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Aim
The aim of this study is to characterize focal liver lesions by CEUS using SonoVue, an UCA, and to assess sensitivity, specificity, and positive predictive value of CEUS in detecting benign and malignant focal liver lesions in comparison with CECT and histopathological correlation.

MATERIALS AND METHODS
This prospective study was conducted in 30 patients with focal liver lesions identified in conventional gray-scale US at Barnard Institute of Radiology, Madras Medical College.

Inclusion Criteria
Those with focal liver lesions detected by conventional USG abdomen and those in renal or hepatic failure were included in the study.

Exclusion Criteria
Pregnant and breastfeeding women, severe hypersensitivity or previous allergic reactions, critically ill patients, severe coronary artery disease, post-extracorporeal shock wave lithotripsy patients within 24 h, under 18 years, uncontrolled systemic hypertension, and adult respiratory distress syndrome were excluded from the study. Triple-phase CECT abdomen was done for 23 patients, and enhancement patterns of focal liver lesions were obtained and analyzed during arterial, portal venous, and delayed phases. CECT abdomen was not done for 7 patients (5 had renal failure, and 2 had hepatic failure) since intravenous contrast was contraindicated in them. Then, a bolus of 1.0-2.4 ml of SonoVue was administered intravenously for all the 30 patients including those with hepatic and renal failure, since SonoVue is not contraindicated in patients with hepatic and renal failure. Real-time imaging of focal liver lesions was done continuously for 3 min using harmonic imaging mode with low mechanical index (MI) (0.08-0.11) in Siemens Acuson Antares USG machine, and enhancement patterns of focal liver lesions in CEUS were obtained, recorded, and analyzed during arterial, portal venous, and delayed phases. Thereafter, both the results were compared. Out of 30 patients, 25 patients were subjected to pathological examination and results obtained. Five patients with hemangioma were not subjected to pathological examination since those lesions are highly vascular.

RESULTS
The study population consisted of 30 consecutive patients with suspected focal liver lesions. The study group consisted of 18 male and 12 female patients, between the age of 11 and 70 years (with a mean age of 40 years). Out of the 30 patients, 5 patients had renal failure, and 2 patients had hepatic failure, so CECT not done. In Table 1, out of total 30 cases, CEUS identified 9 hepatocellular cancer (HCC) cases, and 8 cases were confirmed by fine-needle aspiration cytology (FNAC) as HCC. Four cases of HCC were identified by both CECT and conventional gray-scale USG. Out of the 17 cases of metastatic deposits confirmed by FNAC CEUS, CECT, and conventional gray-scale USG identified 16 (94%), 14 (82%), and 11 (65%) cases, respectively. 12 of the 16 metastases in CEUS were “hypovascular” and showed rim enhancement in the arterial phase; the most common primaries in this group were colorectal (n = 7), stomach (n = 2), and bronchogenic carcinoma (n = 3). The remaining 4 metastases were “hypervascular” on arterial phase imaging with homogeneous enhancement; the primaries in these patients were small-cell lung cancer (n = 1), thyroid carcinoma (n = 2), and renal cancer (n = 1). In the portal venous and delayed phase, all 16 metastases were hypoechoic compared with normal liver. Five cases of hemangioma were identified by both CECT and CEUS, and 4 cases were identified by conventional gray-scale USG. The results of this study show that SonoVue improves sensitivity and specificity in discrimination between benign and malignant focal liver lesions when compared with baseline B-mode sonography. Out of total 30 cases, 5 of the lesions were benign; correct diagnosis of benignity was made in 4 (80%) of these on baseline US and in 5 (100%) after SonoVue. One benign lesion was misinterpreted as malignant after contrast: One benign cyst which did not fill with contrast after the arterial phase. Homogeneous SonoVue enhancement in the late phase is a parameter for benign lesions, whereas more conspicuousness of the lesion due to washout in the late phase is a parameter for malignant lesions. Late-phase imaging with SonoVue is important for differentiation between benign and malignant lesions and early-phase imaging is important for characterizing final diagnosis of the lesions. Peripheral globular-nodular enhancement is predictive for hemangioma and was found in 17% (5 cases) of hemangioma cases in this study. This parameter is comparable with the peripheral globular nodular

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Gray-scale USG</th>
<th>CECT</th>
<th>CEUS</th>
<th>Final diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCC</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>HCC/metastasis</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Metastasis</td>
<td>11</td>
<td>14</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Hemangioma</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Normal</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Begin cyst</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>23*</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

CECT: Contrast-enhanced computed tomography, CEUS: Contrast-enhanced real-time ultrasonography, HCC: Hepatocellular cancer, USG: Ultrasonography
enhancement found on CT. However, the results observed with real-time examination of SonoVue are better than findings reported with gray-scale USG, which showed only 4 of 5 patients with hemangioma. The higher sensitivity of SonoVue is due to the advantages of the low-MI real-time examination with a second-generation contrast agent. The typical enhancement pattern of primary liver carcinoma was an early intranodular enhancement and early washout with whole-lesion or mosaic enhancement.

On CEUS, the typical hemodynamic pattern of HCC was the whole-lesion enhancement or mosaic enhancement in the arterial phase with washout in the late phase (sensitivity 100%; specificity 77%; and positive predictive value 61%).

Diagnostic accuracy of contrast enhancement patterns in characterizing HCC in CEUS (sensitivity 100%; specificity 77%; and positive predictive value 61%) is higher when compared to that of CECT (sensitivity 80%; specificity 73%; and positive predictive value 44%).

On CEUS, the typical hemodynamic pattern of metastasis was the whole-lesion or peripheral rim enhancement in the arterial phase with washout in the late phase (sensitivity 100%; specificity 61.5%; and positive predictive value 77.3%).

Diagnostic accuracy of contrast enhancement patterns in characterizing metastasis in CEUS (sensitivity 100%; specificity 61.5%; and positive predictive value 77.3%) is higher when compared to that of CECT (sensitivity 100%; specificity 30%; and positive predictive value 65%).

Homogeneous enhancement in the late phase was predictive for benign lesions ($P < 0.0001$). Diagnostic accuracy of characterizing benign lesions in CEUS (sensitivity 100%; specificity 100%; and positive predictive value 100%) is higher when compared to that of gray-scale USG (sensitivity 40%; specificity 88%; and positive predictive value 40%).

Conversely, no contrast enhancement in the late phase was predictive for malignant lesions ($P < 0.0001$). Diagnostic accuracy of characterizing malignant lesions in CEUS (sensitivity 100%; specificity 100%; and positive predictive value 100%) is higher when compared to that of gray-scale USG (sensitivity 72%; specificity 60%; and positive predictive value 90%).

Diagnostic accuracy of characterizing HCC in CEUS (sensitivity 87%; specificity 90.9%; and positive predictive value 80%) is higher when compared to that of CECT (sensitivity 37.5%; specificity 93.3%; and positive predictive value 75%) and gray-scale USG (sensitivity 25%; specificity 68.18%; and positive predictive value 22.2%).

Diagnostic accuracy of characterizing metastasis in CEUS (sensitivity 94%; specificity 100%; and positive predictive value 100%) is higher when compared to that of CECT (sensitivity 92%; specificity 79%; and positive predictive value 85%) and gray-scale USG (sensitivity 65%; specificity 62%; and positive predictive value 69%) (Figures 1 and 2).

Diagnostic accuracy of characterizing hemangioma is similar in CEUS and CECT (sensitivity 100%; specificity 100%; and positive predictive value 100%), and it is higher when compared to that of gray-scale USG (sensitivity 40%; specificity 92%; and positive predictive value 50%) (Figures 3-5).

**DISCUSSION**

The characterization of a focal liver lesion requires the assessment of morphological characteristics as well as vascularity and enhancement patterns within the lesion. Therefore, the administration of a contrast agent,
CEUS for focal liver lesion characterization which is clearly superior to that of unenhanced US, as shown already in other studies with SonoVue® and other microbubble contrast agents.10-13

CONCLUSION

Conventional US, being readily available, economical, and safe, remains the imaging modality most widespread worldwide in detecting hepatic focal lesions. CEUS gas has greater sensitivity, specificity, and positive predictive value in characterizing focal liver lesions than CECT and conventional gray-scale USG. SonoVue-enhanced sonography has greater sensitivity and specificity than baseline sonography for the differentiation of benign and malignant liver lesions. CEUS is a promising approach in the non-invasive characterization of focal liver lesions and can be useful as a first-line imaging technique clinically when a focal liver lesion is detectable on USG.

REFERENCES

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Usefulness of Pulmonary Regurgitation Doppler Tracings in Predicting Outcome in Patients with Acute Inferior Wall Myocardial Infarction

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Abstract

Background: Pulmonary regurgitation (PR) flow-derived Doppler curve is useful in recognizing RV involvement during the first 24 hours of AMI. A PR Doppler pattern depends mainly on the diastolic RV pressure pattern, which is altered during AMI. So modification of RV pressure modifies the regurgitant flow pattern.

Aim of the Study: To evaluate the doppler predictors of PR and to assess its prognostic implications in acute MI patients.

Materials and Methods: This is a prospective study conducted in ICCU of Rajiv Gandhi government hospital. Detailed history, physical examination, ECG and two dimensional and Doppler echo and coronary angiography was done for all patients. The prognostic implication of RV involvement was derived by electrocardiographic and echocardiographic criteria.

Results: Out of 94 patients, “Group 1” had 53 patients with PHT ≤ 150 ms & Group 2 had 41 patients with PHT > 150 ms. Statistically significant difference seen in RV dimension, RV/LV ratio, RV FAC, RV ejection fraction, TAPSE, MASV and RV Tei index. Peak PR velocity and end diastolic velocity does not vary between both groups significantly. Mid diastolic minimum velocity has a mean of 0.33 m/sec in Group 1 and 0.69 m/sec in Group2 (p 65 years (p = 0.049), ST elevation in V4R (P = 0.011), RV dilatation in echocardiography (p = 0.018), Doppler criteria indicating RV involvement such as PR pressure half time ≤ 150 msec (0.018) and combined V\text{min} / V\text{max} ≤ 0.5 and PR PHT ≤ 150 msec (P = 0.042). The in-hospital events are also associated significantly with the presence of triple vessel disease in coronary angiogram.

Conclusion: In patients with acute IWMI, flow Doppler tracings of PR are useful in the prediction of in-hospital complications. PR derived parameters (PHT of PR ≤ 150 ms and V\text{min} / V\text{max} ≤ 0.5) are the excellent predictors of overall in-hospital complications.

Key words: Fractional area change, Inferior wall myocardial infarction, Pressure half-time, Pulmonary regurgitation

INTRODUCTION

Right ventricular (RV) acute myocardial infarction (AMI) occurs almost exclusively in setting of inferior wall left ventricular (LV) AMI.¹⁴ It is known that impaired LV function is a major determinant of prognosis in patients surviving AMI. However, little and controversial information is available on the relationship between RV dysfunction and mortality. In a recent report focusing on the relationship between RV ejection fraction and long-term prognosis in patients with MI, Pfisterer et al.¹ concluded that RV dysfunction contributes to the occurrence of cardiac death after MI independent of and in addition to LV impairment.

Non-invasive hemodynamic diagnostic criteria, available at the bedside, may be useful in the acute phase of MI to allow recognition of high-risk patients with RV involvement. Zehender et al.⁶⁷ reported that ST-segment elevation in lead V4R at the time of admission was a strong predictor of in hospital complications. However, the diagnostic accuracy of non-invasive diagnostic criteria varies in different studies.⁷¹³

RV echocardiographic study may represent a valuable alternative. Evaluation of RV systolic function, as well as wall
motion abnormalities or global RV function index, is difficult because of inadequate apical windows and the unusual geometry of the right side of the heart. Continuous wave Doppler tracings of physiologic pulmonary regurgitation (PR) are highly promising tools because PR flow is directly related to the pressure gradient between the pulmonary artery and the right ventricle by the Bernoulli equation.14

PR flow-derived Doppler curve was useful in recognizing RV involvement during the first 24 h of AMI. A PR Doppler pattern depends mainly on the diastolic RV pressure pattern, which is altered during RV ischemia and characterized by a disproportionate increase of RV end diastolic pressure. This physical relation led us to hypothesize that a modification of RV pressure could modify the regurgitant flow pattern.

To test this hypothesis, the present study was designed to systematically search for the presence of a pulmonary regurgitant jet in patients with inferior wall AMI and to compare the modifications of the flow pattern with clinical outcome.

Aims of the Study
1. To evaluate the Doppler predictors of physiological PR in patients with RVMI in the setting of acute inferior wall AMI.
2. To assess the prognostic implications of Doppler characteristics of physiological PR with PR pressure half time (PHT) ≤ 150 ms and the ratio between minimum and maximum minmax/Vmax < 0.5 with respect to in-hospital events in patients with acute inferior wall MI.

MATERIALS AND METHODS

Study Design
The present study was a prospective study conducted in the Department of Cardiology, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, for a period of 3 months. Informed written consent was obtained from all patients before the start of the study. Institutional Ethics Committee approval was obtained.

Study Population
A total of 112 consecutive patients admitted with acute inferior wall ST elevation MI in the coronary care unit are included as study population for 3 months from January 2014. Among 112 patients, 18 patients were excluded as they did not fulfill the criteria to be included.

Inclusion Criteria
1. Presence of physiological PR
2. Prolonged chest pain >30 min
3. Electrocardiographic (ECG) evidence of ≥1 mm ST elevation in ≥2 inferior leads (II, III, aVF)
4. Positive creatine kinase-MB or troponin - t test
5. Sinus rhythm at the time of echocardiography.

Exclusion Criteria
1. Severe PR or no PR
2. Pulmonary hypertension
3. Not willing for angiography
4. Allergic to contrast dye.

Methods
All the patients underwent a detailed history taking, physical examination, electrocardiogram, and biochemical investigations. Patients who were eligible for reperfusion were treated with streptokinase.

Echocardiographic Examination
Two dimensional and Doppler echocardiographic examinations of the patients were done with Esaote MyLab echo machine for all patients.

The probe placed in left parasternal space and shot axis view is obtained. Color Doppler was applied to find out physiological PR and continuous wave Doppler recordings done across PR jet yielding a positive flow spectrum during normal respiration. The following variables had been measured. Peak velocity of PR jet (Vmax min), minimum velocity in mid diastole just before the onset of A wave (Vmin min), PHT of PR. The ratio between the maximum and minimum velocities (Vmax/Vmin) was calculated.

The other parameters studied are RV size and dilatation in apical 4 chamber view, RV wall thickness, LV diameter, LV ejection fraction, RV ejection fraction, RV fractional area change, RV tricuspid annulus planar systolic excursion (TAPSE), RV myocardial performance index (MPI), and tricuspid annular peak systolic velocity (s’).

The tricuspid valve is interrogated in A4C view, and tricuspid regurgitation was recorded and quantified using color Doppler. Inferior vena cava diameter was recorded in both inspiration and expiration in subcostal view.

ECG Data
Right precordial leads V4R and posterior leads were recorded in all patients. RV involvement was suspected in electrocardiogram when there is ST elevation ≥1 mm seen in V4R and similarly posterior wall MI is suspected when similar magnitude of ST elevation is seen in posterior leads.

Cardiac Catheterization
Coronary angiography is performed in all patients during the period of admission within 7 days to assess the extent of coronary artery lesion. Significant coronary artery disease in a vessel is defined as the presence of significant (≥50%) stenosis on a main branch of the coronary
angiogram. Patients are classified as having 1, 2, or 3 vessel disease according to the presence of lesions.

In-hospital Events
The prognostic implication of RV involvement as derived by ECG and ECG criteria; in the short term was evaluated for the following events:
1. Death
2. Severe arrhythmia (sustained ventricular tachycardia, and ventricular fibrillation)
3. High degree atrioventricular block
4. Sinus node dysfunction
5. Need for temporary pacing implantation
6. Low output syndrome (systolic blood pressure <90 mmHg, reduced urine output, need for volume loading, and inotropic support)
7. Ischemic events.
   a. Angina pain
   b. MI
   c. Revascularization (coronary artery bypass grafting/percutaneous coronary intervention).

The patient’s clinical details and ECG values were entered in a pro forma and later tabulated using Microsoft Excel 2007 for statistical analysis.

Statistical Analysis
The patients were grouped according to the Doppler flow characteristics. PR PHT ≤ 150 ms was set as a cutoff value. The patients having PHT ≤ 150 ms were classified as Group 1 and those having PHT > 150 ms were classified as Group 2. Variables between these groups were compare using Chi-square test or Fisher’s exact test. Continuous variables are tabulated as a mean and standard deviation. Mann–Whitney U-test had been used for the analysis of the continuous variables as the test is very robust particularly in non-normal or skewed distributions compared to unpaired student t-test. The univariate analysis was performed to predict in-hospital and 7 days overall events. The statistical analysis was performed by utilizing statistical package for the social sciences (SPSS) version 17.0.

RESULTS AND ANALYSIS OF OBSERVED DATA
A total number of patients in our study is 94. Among these patients, 2 groups have been divided according to the presence of PR PHT ≤ 150 ms. The first group named “Group 1” has 53 patients who have PHT ≤ 150 ms and a second group who have PHT > 150 was named as “Group 2.”

Among Group 1, 69.8% were males and among Group 2 75.6% were males. There is no statistically significant difference between two groups regarding to sex distribution of the patients (P = 0.533). The details of the gender distribution of the patients are tabulated in Table 1 and depicted in Chart 1.

The mean age of patients in Group 1 is about 56.6 years and in Group 2 is 55.5 years. Among total 8 patients who are below the age of 40 years, 2 patients are in Group 1. The patients above the age of 75 years have been considered as high risk for in-hospital and follow-up events. The differences in age wise distribution of the patients between two groups are not significant statistically (P = 0.625). The age wise distribution of the patients is shown in Table 2 below and depicted pictorially in Chart 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Male</th>
<th>Percentage</th>
<th>Female</th>
<th>Percentage</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>37</td>
<td>69.8</td>
<td>16</td>
<td>31.2</td>
<td>53</td>
<td>0.533</td>
</tr>
<tr>
<td>Group 2</td>
<td>31</td>
<td>75.6</td>
<td>10</td>
<td>24.4</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>72.3</td>
<td>26</td>
<td>28.7</td>
<td>94</td>
<td></td>
</tr>
</tbody>
</table>
The patients admitted to coronary care unit with various duration of chest pain. No patients had come to cardiac care unit (CCU) with chest pain <1 h duration. The minimum duration of chest pain which brought the patient to CCU was 2 h.

A total of 51 patients were presented within initial 6 h after onset of chest pain. 12 patients presented more than a day after onset of chest pain. In between groups, the average duration of chest pain in Group 1 is 8.7 h compared to 12.0 h in Group 2. Even though there appears to be having a difference between averages, the difference is statistically not significant ($P = 0.339$). The results are shown in Table 3 and depicted in Chart 3.

Comparing the risk factors between the two groups, 30.1% of patients in Group 1 are diabetics and 28.8% of patients in Group 2 are diabetics. The difference between these groups is statistically not significant. 17 patients in Group 1 who constitute about 31.8% are having systemic hypertension and in Group 2, 15 patients are hypertensives who constitute about 36.5% of the Group 2 population. 22.6% of patients in Group 1 are smokers and in Group 2, 26.8% patients are smokers.

In Group 1, 35.8% patients are having serum cholesterol level >200 mg/dl and in Group 2, 41.46% patients are having serum cholesterol >200 mg/dl. The differences between individual risk factors between both groups were analyzed, and all found to be statistically not significant ($P > 0.05$). The risk factor distribution is depicted in Table 4 and Chart 4.

A total of 43 patients out of total 53 patients in Group 1 were thrombolyzed who constitute about 81.1%. 32 patients out of total 41 patients in Group 2 were thrombolyzed constituting about 78%. A total number of patient’s thrombolyzed in our study were 75 constituting about 79.7% of the whole study population. The difference between groups was not statistically significant ($P = 0.910$). The thrombolysis details are shown in Table 5 and Chart 5.

ST segment elevation in electrocardiogram ≥1 mm is seen in the right sided V4R lead in 98.1% patients in Group 1. One person in Group 1 does not show ST elevation in V4R. In contrary, only one person in Group 2 has shown significant ST elevation in V4R. This observation of the difference between the groups is statistically significant ($P < 0.0001$). Posterior wall MI as diagnosed by ST elevation ≥1 mm in posterior leads such as V9 is seen in 16 patients in Group 1 and in 13 patients in Group 2 which are statistically not significant. Similarly, the presence of significant ST elevation in V6 suggesting associated lateral wall involvement is seen in 3 patients in Group 2 and in only one person in Group 1 which is also not significant statistically. The details are shown in Table 6 and Chart 6.

Various echo parameters between Groups 1 and 2 is shown in Table 7.
Table 4: Risk factors

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Group 1</th>
<th></th>
<th>Group 2</th>
<th></th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>Percentage</td>
<td></td>
<td>Number of patients</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>16</td>
<td>30.18</td>
<td>11</td>
<td>28.82</td>
<td>0.932</td>
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<tr>
<td>SHT</td>
<td>17</td>
<td>31.48</td>
<td>15</td>
<td>36.58</td>
<td>0.765</td>
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<tr>
<td>Smoking</td>
<td>12</td>
<td>22.64</td>
<td>11</td>
<td>26.82</td>
<td>0.821</td>
</tr>
<tr>
<td>Serum cholesterol&gt;200 mg/dl</td>
<td>19</td>
<td>35.84</td>
<td>17</td>
<td>41.46</td>
<td>0.732</td>
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Table 5: Thrombolized status

<table>
<thead>
<tr>
<th>Group</th>
<th>Thrombolized</th>
<th>Not thrombolized</th>
<th>Total</th>
<th>P value</th>
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<td>Number of patients</td>
<td>Percentage</td>
<td>Number of patients</td>
<td>Percentage</td>
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<tr>
<td>Group 1</td>
<td>43</td>
<td>81.1</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td>Group 2</td>
<td>32</td>
<td>78.0</td>
<td>9</td>
<td>22.0</td>
</tr>
<tr>
<td>Total</td>
<td>75</td>
<td>79.7</td>
<td>19</td>
<td>20.3</td>
</tr>
</tbody>
</table>

Table 6: ECG changes ST elevation leads

<table>
<thead>
<tr>
<th>Group</th>
<th>V4R</th>
<th>V9</th>
<th>V6</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>Percentage</td>
<td>Number of patients</td>
<td>Percentage</td>
<td>Number of patients</td>
</tr>
<tr>
<td>Group 1</td>
<td>52</td>
<td>98.12</td>
<td>16</td>
<td>30.18</td>
</tr>
<tr>
<td>Group 2</td>
<td>1</td>
<td>2.43</td>
<td>13</td>
<td>31.70</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>56.38</td>
<td>29</td>
<td>30.85</td>
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</table>

Table 7: Echo parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Units</th>
<th>Mean±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV wall thickness</td>
<td>mm</td>
<td>2.90±0.79</td>
<td>2.97±0.87</td>
</tr>
<tr>
<td>RV dimension</td>
<td>mm</td>
<td>36.62±5.09</td>
<td>25.78±3.37</td>
</tr>
<tr>
<td>LVID days</td>
<td>mm</td>
<td>36.11±5.11</td>
<td>37.90±4.46</td>
</tr>
<tr>
<td>LV EF</td>
<td>%</td>
<td>54.98±6.16</td>
<td>51.07±12.26</td>
</tr>
<tr>
<td>RV/LV ratio</td>
<td>Ratio</td>
<td>1.01±0.07</td>
<td>0.68±0.11</td>
</tr>
<tr>
<td>RV FAC</td>
<td>%</td>
<td>26.37±5.24</td>
<td>41.18±7.78</td>
</tr>
<tr>
<td>RV EF</td>
<td>%</td>
<td>32.44±4.40</td>
<td>44.74±6.18</td>
</tr>
<tr>
<td>TAPSE</td>
<td>mm</td>
<td>12.74±3.26</td>
<td>19.11±3.70</td>
</tr>
<tr>
<td>TASV (S')</td>
<td>cm/s</td>
<td>7.91±2.46</td>
<td>14.32±3.61</td>
</tr>
<tr>
<td>RV MPI</td>
<td></td>
<td>0.49±0.08</td>
<td>0.30±0.11</td>
</tr>
<tr>
<td>(Tei index)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IVC diameter</td>
<td>Inspiration mm</td>
<td>8.09±2.68</td>
<td>8.65±3.04</td>
</tr>
<tr>
<td>IVC diameter</td>
<td>expiration mm</td>
<td>19.81±4.21</td>
<td>18.09±4.13</td>
</tr>
</tbody>
</table>


does not significantly differ between both groups. The RV/LV ratio in Group 1 patient has mean of 1.01 whereas, in Group 2, it is 0.68. Mean RV fractional area change in Group 1 is 26.3% and in Group 2 the mean right ventricular fractional area change is 41.1%. Mean RV ejection fraction in Group 1 patients is 32.4% and in Group 2 is 44.7%. The measurement of TAPSE has a mean of 12.7 mm in Group 1 patients and Group 2 patients is 19.1 mm. The tissue Doppler derived the value of tricuspid annular systolic velocity (TASV) (S') differ in both groups with a mean of 7.9 cm/s in Group 1 and 14.3 cm/s in Group 2.

The RV myocardial performance index (Tei index) is different in both groups with a mean of 0.49 in Group 1 and mean of 0.3 in Group 2. Statistical analysis of all the above parameters shows that the following parameters are statistically significant in the following - RV dimension, RV/LV ratio, RV FAC, RV ejection fraction, TAPSE, mitral annular systolic velocity, and RV Tei index. Others are not statistically significant.

PR Doppler flow characteristics are compared between two groups. Peak PR velocity does not vary significantly between two groups. Similarly, the end diastolic velocity does not vary between both groups significantly. Mid diastolic minimum velocity has a mean of 0.33 m/s in Group 1 and 0.69 m/s in Group 2. The difference between the groups is statistically significant with P < 0.0001. The ratio between Vmax/Vmin is different between the two groups. The difference is statistically significant (P < 0.0001). The mean PHT in Group 1 is 100.1 ms and in Group 2 is 229 ms. The values are tabulated in Table 8.

Tricuspid regurgitation was not present in all cases. TR is present in only in 32.0% of patients in Group 1 and only 17.0% in Group 2 patients. The difference between these observations was not statistically significant (P = 0.156).
Regarding severity of TR, severe TR was present in four persons in Group 1 accounting for 7.54%, and No patient in Group 2 had any severe TR. The difference in the presence of severe TR does not achieve statistical significance.

Similarly, regarding PR severity, moderate PR was present in 3 of the patients of Group 1 and 1 of the patients of Group 2. There is no statistically significant difference between the two groups regarding the severity of PR. The results are displayed in Table 9.

A total of 40 out of the total 94 patients had in-hospital complications in the total study population. Percentage of the patients in Group 1 who had in-hospital complications is 54.7% and in Group 2 is 26.8%. When the number of overall in-hospital complications in each group was analyzed for a significant difference, it turned out to be statistically significant \( P = 0.012 \). Hypotension was present in 11 patients, reduced urine output was present in 5 patients, and requirement of volume loading was present in 11 patients. 5 patients were in cardiogenic shock, and 6 patients were in congestive cardiac failure. Except for oliguria, all the above indices for low volume status have the statistically significant difference between two study groups.

Total number of in-hospital deaths in our study is 7. The mortality rate in our study population in the in-hospital set up is 7.44%. All deaths occurred in Group 1, and Group 2 does not have any in-hospital mortality. The statistical analysis showed that there is a significant difference in mortality between two groups with \( P = 0.043 \). Heart blocks occurred significantly in Group 1 patients were 7 of them developed this complication while none of the Group 2 patients developed any heart block. This occurrence of heart block in Group 1 patients is statistically significant with a \( P = 0.043 \).

Significant arrhythmias were seen in 6 patients out of whom 4 patients belong to Group 1 and 2 patients belong to Group 2. The difference was statistically not significant \( (P = 0.92) \). 9 out of total 94 patients received temporary pacemaker during the course of illness. 8 patients belonged to Group 1 and one patient belonged to Group 2. No statistical difference was made out in between these groups regarding temporary pacemaker insertion placement \( (P = 0.08) \).

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Unit</th>
<th>Mean±SD</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak PR velocity</td>
<td>m/s</td>
<td>1.41±0.41</td>
<td>0.331</td>
</tr>
<tr>
<td>End diastolic PR velocity</td>
<td>m/s</td>
<td>0.72±0.27</td>
<td>0.752</td>
</tr>
<tr>
<td>Mid diastolic minimum</td>
<td>m/s</td>
<td>0.45±0.19</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>( V_{\text{max}}/V_{\text{min}} )</td>
<td>Ratio</td>
<td>0.33±0.15</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>PHT of PR</td>
<td>ms</td>
<td>100.1±29.5</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

SD: Standard deviation, PR: Pulmonary regurgitation, PHT: Pressure half time

**Table 8: Echo parameters - pulmonary regurgitation**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR present</td>
<td>17</td>
<td>32.07</td>
</tr>
<tr>
<td>TR severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trivial</td>
<td>5</td>
<td>9.43</td>
</tr>
<tr>
<td>Mild</td>
<td>7</td>
<td>13.20</td>
</tr>
<tr>
<td>Moderate</td>
<td>1</td>
<td>1.96</td>
</tr>
<tr>
<td>Severe</td>
<td>4</td>
<td>7.54</td>
</tr>
<tr>
<td>PR severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trivial</td>
<td>20</td>
<td>37.73</td>
</tr>
<tr>
<td>Mild</td>
<td>30</td>
<td>56.60</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
<td>5.67</td>
</tr>
<tr>
<td>Severe</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 9: Echo parameters - regurgitation severity**
Regarding clinical events, 11 patients developed angina chest pain during the stay in the hospital accounting for 11.7% of the study population. There is no statistically significant difference between two groups regarding recurrent angina ($P = 0.84$). The reinfarction rate in the study population was 4.25%. Three persons from Group 1 and one person from Group 2 has a recurrence of MI, and the difference is not statistically significant ($P = 0.79$). Revascularization was required in 7 patients in whom 4 belonged to Group 1. No statistically significant difference was observed in between groups pertaining to revascularization ($P = 0.72$). The details of the in-hospital outcome group wise are shown in Table 9.

Univariate analysis showed that following variables were associated significantly with total in-hospital events - Age > 65 years ($P = 0.049$), ST elevation in V4R ($P = 0.011$), RV dilatation in echocardiography ($p = 0.018$). Doppler criteria indicating RV involvement such as PR PHT ≤ 150 ms (0.018) and combined $V_{\text{min}}/V_{\text{max}} \leq 0.5$ and PR PHT ≤ 150 ms ($P = 0.042$). The in-hospital events are also associated significantly with the presence of triple vessel disease in coronary angiogram ($P < 0.0001$). The odds ratio is highest for the presence of triple vessel disease for the occurrence of in-hospital events (relative risk = 3.5, CI = 1.2-9.9, $P < 0.0001$). Other factors which predict in-hospital events are age > 65 years, ST elevation in V4R and Doppler flow characteristics of PR. The odds ratios for the variables with confidence intervals are tabulated in Table 10.

**Table 10: In-hospital complications**

<table>
<thead>
<tr>
<th>In-hospital Complications</th>
<th>Group 1</th>
<th>Percentage</th>
<th>Number of patients</th>
<th>Group 2</th>
<th>Percentage</th>
<th>Total</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall complications</td>
<td>29</td>
<td>54.71</td>
<td></td>
<td>11</td>
<td>26.82</td>
<td>40</td>
<td>0.012</td>
</tr>
<tr>
<td>Hypotension</td>
<td>10</td>
<td>18.86</td>
<td></td>
<td>1</td>
<td>2.43</td>
<td>11</td>
<td>0.032</td>
</tr>
<tr>
<td>Oliguria</td>
<td>5</td>
<td>9.43</td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0.119</td>
</tr>
<tr>
<td>Requirement for volume loading</td>
<td>12</td>
<td>22.64</td>
<td></td>
<td>2</td>
<td>4.87</td>
<td>15</td>
<td>0.035</td>
</tr>
<tr>
<td>Requirement for inotropes</td>
<td>9</td>
<td>16.98</td>
<td></td>
<td>1</td>
<td>2.43</td>
<td>11</td>
<td>0.053</td>
</tr>
<tr>
<td>Cardiogenic shock</td>
<td>5</td>
<td>9.43</td>
<td></td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0.119</td>
</tr>
<tr>
<td>CCF</td>
<td>3</td>
<td>5.66</td>
<td></td>
<td>3</td>
<td>7.31</td>
<td>6</td>
<td>0.919</td>
</tr>
<tr>
<td>Death</td>
<td>7</td>
<td>13.20</td>
<td></td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0.043</td>
</tr>
<tr>
<td>Heart block</td>
<td>7</td>
<td>13.20</td>
<td></td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0.043</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>4</td>
<td>7.54</td>
<td></td>
<td>2</td>
<td>4.87</td>
<td>6</td>
<td>0.920</td>
</tr>
<tr>
<td>Requirement for TPI</td>
<td>8</td>
<td>15.09</td>
<td></td>
<td>4</td>
<td>9.75</td>
<td>11</td>
<td>0.847</td>
</tr>
<tr>
<td>Recurrent angina</td>
<td>7</td>
<td>13.20</td>
<td></td>
<td>4</td>
<td>9.75</td>
<td>11</td>
<td>0.847</td>
</tr>
<tr>
<td>Recurrent MI</td>
<td>3</td>
<td>5.66</td>
<td></td>
<td>1</td>
<td>2.43</td>
<td>4</td>
<td>0.799</td>
</tr>
<tr>
<td>Revascularization</td>
<td>4</td>
<td>7.54</td>
<td></td>
<td>3</td>
<td>7.31</td>
<td>7</td>
<td>0.723</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The present study is conducted to evaluate the prognostic implications of Doppler derived parameters of PR in cases of acute inferior wall MI. Univariate analysis of variables associated with total in-hospital events is shown in Table 11.

The non-invasive diagnostic criteria used in our study, which is based on validated hemodynamic and angiographic criteria, are highly sensitive of RV ischemia and therefore may be used as a more accurate method of differentiating patients with and without RV involvement.

The Doppler evaluation of PR was done in patients with acute inferior wall myocardial infarction (IWMI) by Cohen et al. in 1995 which concluded that when the cut off for PR PHT was kept below 150 ms and ratio between minimum and maximum velocities $V_{\text{min}}/V_{\text{max}} \leq 0.5$, they indicated the presence of associated RV infarction with the sensitivity of 100% and specificity of 89%. The study was conducted with hemodynamic confirmation of RVMI in cases of IWMI. The same Doppler echocardiographic criteria applied in our study to analyze associated RVMI in IWMI patients and the prognostic impact of the RV involvement.
Bueno et al. showed that in patients with RVMI, in-hospital case fatality rate was 47% compared with 10% in patients without RV involvement (P < 0.001). The most common cause of death was non-reversible low cardiac output cardiogenic shock. In our study, the most common cause of death was refractory hypotension and ventricular arrhythmias.5

In our study, the mortality rate in acute IWMI is about 7.4% which is in contrast to the study conducted by Zehender et al. where the mortality rate in inferior wall infarction patients was 19%.6 In the same study, the case fatality rate for RV involvement in acute IWMI was 31% compared to our study which is about 13.2%. The reduction of mortality after RVMI may be attributed to the early recognition of RVMI, better reperfusion strategies and improvement in the quality of care in coronary care units.6

The presence of ST elevation in V4R is an important clinical variable available at the bedside to assess the prognosis of the patient which predict in-hospital mortality with a relative risk of 7.7 and major complications with a relative risk of 4.7. In our study, the presence of ST elevation in V4R has prognostic implications for the major in-hospital events with an odds ratio of 1.5 which is statistically significant.

Results of our study are comparable to the study by Cohen et al., in terms of in-hospital mortality. A study conducted by Cohen et al. found that the mortality in cases of IWMI was 6% which is in our study is 7.4%. But in that study, they cannot confirm the poor prognostic outcome of independent ST elevation in V4R which is demonstrated in our study.16

Among the risk factors, age > 65 years is the only risk factor which showed statistically significant association with in-hospital events. The other traditional risk factors of cardiovascular disease such as smoking, diabetes mellitus, systemic hypertension, and hypercholesterolemia were not able to demonstrate prognostic implications in our study. This may be due to a small number of the study population, and hence any small difference in prognosis may not be able to translate into statistical significance.

Recent studies have found out that the extent of RVMI and RV dysfunction as assessed by cine magnetic resonance imaging after ST-segment elevation MI, are prognostic indicators, which correlates with our study showing echocardiographic indices of RV dilatation and RV dysfunction such as TAPSE, and TASV are independent prognostic factors for early in-hospital events.17

### CONCLUSIONS

1. In patients with inferior wall AMI, flow Doppler tracings of PR are useful in the prediction of in-hospital complications. PR derived parameters (PHT of PR ≤ 150 ms and V_{min}/V_{max} ≤ 0.5) were the excellent predictors of overall in-hospital complications.
2. PHT ≤ 150 ms and the minimum velocity of PR tracings in mid diastole to the peak early diastolic velocity of PR ratio (V_{min}/V_{max}) ≤ 0.5 were excellent predictors of RV involvement in the setting of inferior wall MI.
3. Low output syndrome is a frequent, specific, and potentially severe complication of RV infarction.

### Limitations of the study

1. The study population was small, hence it needs to be evaluated whether the results obtained in this study would generalize to other patient groups or not. Clinical trials with larger study populations are needed to assess this.
2. Long-term follow-up of patients was not done to assess the long-term prognosis.
3. The characteristics of the infarct related artery such as thrombus burden, lesion morphology, and TIMI flow grade are not taken into consideration for the study purpose.
4. The status of thrombolysis whether successful or failed is not considered in determining the prognosis, which might play a big role in determining in-hospital and long-term prognosis.
5. The exclusion of a sizeable number of patients who do not have physiological PR which may skew the results.

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integral part of the work, were always kind and cooperative. We pray for their speedy recovery and place this study as a tribute to them.

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Correlation between Benign Prostatic Hyperplasia and Coronary Artery Disease

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Abstract

Introduction: Coronary artery disease (CAD) and benign prostatic hyperplasia (BPH) both are considered as multifactorial process. Smooth muscle proliferation is an important and possibly an androgen-dependent step in the development of atherosclerosis and BPH. Insulin such as growth factor, inflammation, and metabolic syndrome plays a central role in pathogenesis of BPH and CAD.

Purpose: The purpose of this study is to study occurrence of CAD among subjects with BPH, occurrence of BPH among subjects with CAD, and correlation between them.

Materials and Methods: A total of 150,75 subjects with BPH (lower urinary tract symptoms with ultrasonography [USG] evidence/raised age-specific serum prostate-specific antigen [PSA]) and 75 subjects without BPH were included. PSA was measured by chemiluminescence method, prostate volume with transabdominal USG. CAD was diagnosed with the help of electrocardiogram, 2D-ECHO, Tread Mill Test (TMT), and documented history of angioplasty.

Results: The occurrence of CAD among 75 subjects with BPH (30.66%) was significantly higher than 75 subjects without BPH (12%) (P < 0.05) and even after excluding subjects with risk factor/factors (22.5% versus 7.4%; P < 0.05, respectively). Among subjects with CAD (32/150), occurrence of BPH was 27.81% more as compared to subjects without CAD (118/150). Mean serum PSA level and mean prostatic volume were also significantly higher in subjects with CAD as compared to subjects without CAD.

Conclusion: The occurrence of CAD was found to be significantly higher among subjects with BPH (even after excluding subjects with risk factors). Occurrence of BPH was also significantly higher among subjects with CAD along with mean serum PSA and mean prostatic volume. Thus, a significant correlation can exist between CAD and BPH.

Key words: Benign prostatic hyperplasia, Coronary artery disease, Prostate-specific antigen, Tread mill test

INTRODUCTION

Ischemic heart disease (IHD) is a condition in which there is an inadequate supply of blood and oxygen to a portion of myocardium and is a consequence of myocardial oxygen supply and demand mismatch.¹

Coronary artery disease (CAD) is a term used for atherosclerotic changes in coronary artery itself. There can be numerous causes of ischemic heart disease such as cardiomyopathy causing relative ischemia, embolus in coronary artery from anywhere in body, and arteritis. However, the most common cause of myocardial ischemia is atherosclerotic disease of an epicardial coronary artery (or arteries) sufficient to cause a regional reduction in myocardial blood flow and inadequate perfusion of the myocardium supplied by the involved coronary artery.¹ Hence, for practical purposes, the terms CAD and IHD can be used interchangeably.

The various modifiable and non-modifiable risk factors for atherosclerosis include age, diabetes, male gender, smoking, hypertension, dyslipidemia, obesity, family history, chronic inflammation, hyperhomocysteinemia, renal diseases, and increased calcium score.

It is well documented that the frequency of CAD is influenced by gender as well as hormonal status. The risk
of CAD is significantly lower in premenopausal women as compared to men and postmenopausal women.²

Atherosclerosis, the underlying pathology responsible for CAD, is an inflammatory disease. Recent observations suggest that the atherosclerotic process is characterized by a low-grade inflammation altering the endothelium of the coronary arteries and is associated with an increase in levels of markers of inflammation such as acute-phase proteins and cytokines. Cumulative evidence indicates that inflammation, at both focal and systemic levels, plays a key role in destabilization and rupture of atherosclerotic plaques, leading to acute cardiovascular events.³

Benign prostatic hyperplasia (BPH), also called benign enlargement of the prostate (BEP or BPE), is a non-cancerous increase in size of the prostate. BPH involves hyperplasia of prostatic stromal and epithelial cells, resulting in the formation of large, fairly discrete nodules in the transition zone of the prostate.⁴

It appears to be androgen-dependent process, as castrated boys do not develop BPH when they age.⁵

The modifiable and non-modifiable risk factors for BPH include age, genetics, hormones, metabolic syndrome, obesity, diabetes, and chronic inflammation.⁶

BPH may itself be considered as a form of asymptomatic inflammatory prostatitis, whose pathogenesis may be triggered by a multitude of factors and pathways. The release of prostatic self-antigens following tissue damage may sensitize the immune system and start autoimmune responses.⁷

Smooth muscle proliferation is an important and possibly an androgen-dependent step in the development of atherosclerosis and BPH. Insulin-like growth factor (IGF-1) also plays a common role in pathology of BPH and CAD.

In the absence of other prostatic pathology, serum prostate-specific antigen (PSA) levels correlate positively with prostatic volume of BPH, as determined by transrectal ultrasound, in a log-linear fashion.

Since serum PSA is an objective measurement and readily obtained, it was used as a BPH surrogate. This technique allows us to assess a large number of men in non-invasive manner.⁸⁻⁹

PSA is a serine protease that cleaves insulin-like growth factor-binding protein-3 (IGFBP3), thereby decreasing its affinity for IGF-1. Dissociation of the IGF-1 - IGFBP3 complex renders IGF-1 available to bind to its receptor and stimulates cellular proliferation.¹⁰

The significantly lower color pixel density and higher resistive index in color Doppler ultrasonography (USG) of transition zone of prostate in patients with vascular disease than in healthy subjects support the hypothesis that an age-related impairment of blood supply to the prostate may have a key role in the development of BPH.¹¹

Nocturia is one of the common lower urinary tract symptoms (LUTS), which causes sleep disturbances, daytime fatigue, lower level of general well-being, repeated awakening, and voiding episodes. This increases the sympathetic activity and may disturb blood pressure rhythmicity which in turn may lead to high cardiovascular disease morbidity such as angina pectoris and myocardial infarction.¹²

**MATERIALS AND METHODS**

A observational study was carried out in the Department of Medicine, NSCB Medical College, Jabalpur, during March 2015 to August 2016. Informed consent was obtained from all the subjects. Approval from the Institutional Ethical Committee was taken before conducting the study.

Study population: A total of 150 subjects of different age groups and male sex were included in the study. The subjects comprised of two groups: 75 subjects with BPH and 75 subjects without evidence of BPH.

A detailed history of each subject was taken which includes symptoms of CAD-anginal chest pain, shortness of breath, chest pain on exertion, symptoms of BPH/LUTS (difficulty in micturition, urine urgency, dribbling of urine, nocturia), urinary tract infection (UTI) (fever with chills and rigor, burning micturition), history of smoking, past history of diabetes, past history of CAD, hypertension, and drug history. Thorough physical examination including body mass index (BMI), blood pressure (BP) measurement and all other relevant systemic examination was carried out.

Subjects with evidence of either raised age-specific serum PSA value or USG volume of prostate >30 ml with LUTS were considered as BPH (n = 75) and subjects with no evidence of BPH were included (with the help of history, transabdominal ultrasound/serum PSA) for comparison (n = 75). Further groups for the study were created from these two groups.

Following points were considered for BPH in subjects: LUTS with either volume of prostate >30 cc or raised...
age-specific serum PSA. PSA is a useful tool in clinical setting. It can be accurately measured with a simple clinical test, and this technique allows us to assess large number of subjects in an objectively yet non-invasive fashion. In this study, we have excluded the following subjects with serum PSA > 10 ng/ml as there are more chances to have prostatic cancer; subjects who have undergone any transurethral procedures, prostatic biopsy or had been exposed to any drug known to change the value of serum PSA and subjects having UTI were also excluded with the help of history and urine routine microscopy.

Volume of prostate was measured by transabdominal USG not by transrectal USG (TRUS) as TRUS is an invasive procedure and many subjects may not give consent for it, and digital rectal examination (DRE) not included in clinical examination as it might raise PSA and could have incurred false-positive result.

Following points were considered for CAD in subjects:
1. CAD - Acute coronary syndrome (STEMI/NSTEMI/unstable angina):
   A. Symptoms of ischemia along with detection of a rise and/or fall of cardiac biomarker values with at least one value above the upper reference limit were considered as acute MI.
   B. Symptoms of ischemia along with one of the following in the absence of raised cardiac biomarkers:
      a. New or presumed new significant ST-segment-T wave (ST-T) changes or new left bundle branch block.
      b. Development of pathological Q-waves in the electrocardiogram (ECG).
      c. Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.
2. Evidence of prior myocardial infarction (any one of the following)
   A. Pathological Q-waves with or without symptoms in the absence of non-ischemic causes.
   B. Imaging evidence of a region of loss of viable myocardium that is thinned and fails to contract, in the absence of a non-ischemic cause.
4. Documented history of coronary angioplasty or coronary artery bypass grafting or significant coronary artery stenosis (>50%) on coronary angiography.

Inclusion criteria - subjects with BPH and/or subjects with CAD were included in the study. Age group 35-80 years; subjects having history of MI, H/O coronary angioplasty, IHD; subjects willing to give informed consent for participation in this study; subjects having BPH having history of established CAD/proved on provocative test (TMT)/finding in ECG/2D-ECHO; subjects willing to give informed consent for participation in this study were included in the study.

Exclusion criteria - subjects having serum PSA level >10 ng/ml, established prostatic cancer, urinary infection, history of transurethral resection of the prostate/any transurethral procedure, and history of taking any alpha blocker drug for hypertension were excluded from the study.

After having been selected for the study, each subject underwent the following procedure: Detailed history, careful clinical examination, ECG, blood sugar (fasting blood sugar/post-prandial blood sugar/random blood sugar) or HbA1C ≥ 6.5%, 12 h fasting lipid analysis, 2D-ECHO, treadmill test (ECG stress test)/coronary angiography, transabdominal USG for prostate volume and post-void residual volume of urine, age-specific serum PSA, urine routine, and microscopy.

According to NCEP-ATP III guidelines, dyslipidemia was considered when serum total cholesterol ≥200 mg/dl or/and low-density lipoprotein cholesterol ≥ 130 mg/dl or/and high-density lipoprotein cholesterol ≤40 mg/dl or/and serum triglyceride ≥ 150 mg/dl.

Obesity BMI ≥ 25 kg/m², hypertension was defined as systolic BP more than 140 mm Hg and/or diastolic BP more than 90 mm Hg.

Following tools were used: USG machine (Log iQ - 3 expert) model no: AY-15CUK; ECG machine: Magic R; 2D-ECHO machine - Philips HD-7 XE; ECG machine - Schiller CS-200; Serum PSA - chemiluminescence.

Methods
2D-ECHO was carried out for some subjects who were not affordable for TMT. In 2D-ECHO, regional wall motion abnormality without any other cause of ischemia was considered as a sign of CAD. TMT and ECHO were reported by expert cardiologists.

In this study, first, the occurrence of CAD in age-matched subjects with BPH and without BPH was calculated according to above criteria. After exclusion of risk factors in both groups, the same was calculated to find a direct correlation.

The occurrence of BPH, mean serum PSA, and mean prostatic volume in subjects with CAD and subjects without CAD were calculated from the study group in same
way but by different statistical method because of unequal distribution of subjects in this group and consequently correlation calculated accordingly.

RESULTS

A total number of 150 male subjects was included in the study. Mean age of the whole study group was 50.46 years. Out of 150 subjects, two groups were created each comprising 75 subjects, one with BPH, and one without BPH. Mean age of subjects with BPH and without BPH was 51.01 ± 7.63 years and 49.92 ± 7.64 years, respectively, and the difference was not statistically significant (P > 0.05). Out of 75 subjects with BPH, 23 had CAD (30.66%), and out of 75 subjects without BPH, 9 had CAD (12%). The difference of occurrence of CAD between both these groups was statistically significant (P < 0.05), but after taking risk factor/factors (obesity, diabetes, hypertension, smoking, and dyslipidemia) into consideration, (46.66% vs. 28%) both groups had statistically significant difference (P < 0.05) (Table 1).

As the presence of risk factors might have affected the occurrence of CAD because the difference of presence of risk factors was significant, so further study groups were created after exclusion of subjects with risk factor/factors. After exclusion of subjects with risk factor/factors, subjects with BPH and without BPH were 40 and 54, respectively, mean age of the two groups was 51.18 ± 8.30 years and 50.44 ± 7.75 years, respectively, and the difference between mean age was not statistically significant (P > 0.05). Out of 40 subjects with BPH, CAD was present in 9 subjects (22.5%) as compared to a group of 54 subjects without BPH, 4 had CAD (7.4%). The difference of occurrence of CAD between these age and risk factor matched group was statistically significant (P < 0.05).

Out of 150 subjects, CAD was present in 32 subjects. Mean age of subjects with CAD was 51.03 ± 5.78 years and that of subjects without CAD was 50.31 ± 8.07 years, and the difference between mean age of both these age groups was not statistically significant (P > 0.05). Among subjects with CAD, risk factors were present in 14/32 (43.75%), and among subjects without CAD, risk factors were present in 28/118 (27.81%), and the difference was not statistically significant (P > 0.05). The occurrence of BPH among subjects with CAD was 23/32 and among subjects without CAD was 52/118, which was 27.81% higher among subjects with CAD (P < 0.05). Mean serum PSA among subjects with CAD and among subjects without CAD was 2.96 ± 0.97 ng/ml and 1.80 ± 1.09 ng/ml, respectively, and the difference was statistically significant (P < 0.05). Mean prostatic volume among subjects with CAD and subjects without CAD was 34.72 ± 4.67 cc and 26.90 ± 5.72 cc, respectively, and the difference was statistically significant (P < 0.05).

To know correlation between CAD with serum PSA and prostate volume, group of subjects without BPH was studied. Out of 75 subjects without BPH, there were no risk factors in 54 subjects. Out of these 54 subjects, CAD was present in 4 subjects and was absent in 50 subjects. Mean age of subjects with CAD and subjects without CAD was 48.00 ± 0.81 years and 50.64 ± 8.02 years, respectively, and the difference was not statistically significant (P > 0.05). Mean PSA of subjects with CAD and those of subjects without CAD was 1.94 ± 0.52 ng/ml and 1.44 ± 0.96 ng/ml, respectively, and the difference was not statistically significant (P > 0.05), but difference between mean prostatic volume was statistically significant (28 ± 1.63 cc versus 22.08 ± 1.61 cc; P < 0.05).

DISCUSSION

Among subjects with BPH, CAD was present in 23 out of 75 subjects which was 30.66%. Among subjects without BPH, CAD was present in 9 out of 75 which was 12%, and occurrence was 18.66% more in subjects with BPH than in subjects without BPH. This difference was statistically significant ($\chi^2 = 7.79; P < 0.05$) as shown in Table 1.

In a study done by Bruno and Summers on 50 patients with mean age of 73.53 years, there were 6 diabetic patients in this series (6/50). Glands from diabetic patients were significantly larger. Out of the 50 patients, in his study, 27 (54%) had died (including) 12 of myocardial infarction and 3 of arteriosclerotic disease. He found that 30% of the patients (15/50) who died of ischemic heart disease had larger glands (97.3 ± 27.85 g) than the remaining patients in this series (71.24 ± 8.87 g). This was statistically significant ($P < 0.001$). 13

In study done by Ozden et al., it was found that median annual total prostate (TP) growth rate and median annual transition zone (TZ) growth rate were significantly higher in patients with metabolic syndrome as compared to patients without metabolic syndrome. 14

Table 1: Comparison of parameters between subjects with BPH and subjects without BPH

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Subjects with BPH (n=40)</th>
<th>Subjects without BPH (n=54)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>51.01±7.63</td>
<td>49.92±7.64</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Presence of CAD</td>
<td>23/75 (30.66%)</td>
<td>9/75 (12%)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Risk factor</td>
<td>35/75 (46.66%)</td>
<td>21/75 (28%)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

BPH: Benign prostatic hyperplasia, CAD: Coronary artery disease
Obesity, hypertension, dyslipidemia, smoking, and diabetes are traditional risk factors for CAD, and these factors affect the occurrence of CAD.

Hence, even after exclusion of subjects with even a single risk factor, the difference between occurrence was still significant as shown in Table 2.

Similar findings were also observed in a study done by Weisman et al., on age group of 65-80 years (mean age of cases 72.2 ± 4.2; control 71.6 ± 5.1) in age- and risk factor-matched subjects where they found frequency of CAD as 29% and 9% in cases and control, respectively, which was statistically significant.¹³

In age- and risk factor-matched subjects, it was found that the occurrence of BPH, mean prostatic volume, and mean serum PSA level was more in those with CAD (n = 32) than those without CAD (n = 118) as shown in Table 3.

In study done by Berger et al., on 23 CAD subjects and 31 normal controls, it was found that prostatic volume was higher (39 cc) in subjects with CAD as compared to controls (24 cc) although it was not statistically significant.¹¹

Hypoxia/microvascular ischemia-induced smooth muscle proliferation may be a pathogenesis behind this. Hypoxia induces expression not only of hypoxia inducible factor 1 but also of angiogenic growth factors such as vascular endothelial growth factor (VEGF), fibroblast growth factors-2 and -7, and transforming growth factor beta, as well as cytokines such as interleukin-8. Long-term exposure of the prostatic stroma to increased growth factor levels secondary to chronic hypoxia might cause stimulation of stromal growth over the years, and thus, contribute to the pathogenesis of BPH. This concept is supported by the finding that patients with peripheral arterial occlusive disease and diabetics have significantly larger prostates than controls (P < 0.001). Furthermore, chronic ischemia has recently been shown to induce marked hyperplasia of the ventral prostate in the rat, through VEGF upregulation.¹⁶

In the discussion, till now, from Tables 1-3, occurrence of BPH was more in patients with CAD than without CAD, and mean PSA and mean prostatic volume was more in subjects with CAD than without CAD.

The occurrence of BPH was more in subjects with CAD that in turn perhaps has led to an increased mean PSA and mean prostatic volume.

To study the direct effect of CAD on PSA and prostatic volume, it would be better to study the group without BPH.

For further study, 54 out of 75 subjects without BPH were taken as rest 21 subjects had risk factors, and as discussed earlier, the presence of risk factor can affect the occurrence of both BPH and CAD which in turn may affect the value of mean prostatic volume and mean PSA.

This group comprises of a total of 54 subjects. Out of 54, subjects with CAD were 4 and without CAD were 50. The mean age of subjects with CAD (n = 4) was 50.64 ± 8.02 years and that of subjects without CAD was 48.00 ± 0.81 years. No statistically significant difference in the mean age of both these groups was noted as shown in Table 4.

Mean PSA of 4 subjects with CAD in this group was 1.94 ± 0.52 ng/ml and mean PSA of remaining 50 subjects without CAD was 1.44 ± 0.96 ng/ml. Although there was a difference of 0.50 ng/ml, it was not statistically significant (Table 4). To study proper significance, larger sample size is needed.

Satiroglu et al., in their study, on 100 suspected CAD patients with mean age of 57 ± 10 years, coronary angiography results were normal in 13, 87% were diseased (non-obstructive CAD [non-critical plaque formation] in 16%, one-vessel disease in 21%, two-vessel disease in 30%, and multivessel disease in 20%). Mean values of total and PSA were 1.4 ± 1.3 ng/mL. Although there was an increasing trend of PSA with more advanced stages of CAD, no significant relationship was established (P > 0.05).¹⁷

Mean prostatic volume of 4 subjects with CAD in this group was 28.00 ± 1.63 cc, and mean prostatic volume of

| Table 2: Comparison of parameters between subjects with BPH and subjects without BPH (after excluding subjects with risk factor/factors) |
| Parameters | Subjects with BPH (n=40) | Subjects without BPH (n=54) | P value |
| Mean age | 51.18±8.30 years | 50.44±7.75 years | >0.05 |
| Presence of CAD | 9/40 (22.5%) | 4/54 (7.4%) | <0.05 |

BPH: Benign prostatic hyperplasia, CAD: Coronary artery disease

| Table 3: Comparison of parameters between subjects with CAD and subjects without CAD |
| Parameters | Subjects with CAD (n=32) | Subjects without CAD (n=118) | P value |
| Mean age | 51.03±5.78 years | 50.31±8.07 years | >0.05 |
| Risk factors | 14/32 (43.75%) | 56/118 (47.45%) | >0.05 |
| Presence of BPH | 23/32 (71.87%) | 52/118 (44.06%) | <0.05 |
| Mean PSA | 2.96±0.97 ng/ml | 1.80±1.09 ng/ml | <0.05 |
| Mean prostatic volume | 34.72±4.67 cc | 26.90±5.72 cc | <0.05 |

BPH: Benign prostatic hyperplasia, CAD: Coronary artery disease, PSA: Prostate-specific antigen
remaining 50 subjects without CAD was 22.08 ± 1.61 cc. The difference of volume of prostate between these two groups was statistically significant (Table 4).

About similar findings were noted by Inci et al., in their study, on 45 subjects with CAD and 47 controls with mean age 55.7 ± 11.7 years and 53.5 ± 13.0 years, found the mean prostate volume of CAD subjects 39.1 ± 10.3 cc and controls 33.5 ± 9.4 cc. The difference of mean prostate volume was statistically significant (P < 0.05).18

**CONCLUSION**

In subjects with BPH, a significant association was found with CAD than subjects without BPH which remained so even after exclusion of subjects with risk factor/factors. In age- and risk factor-matched subjects, it was found that those with CAD had significantly higher occurrence of BPH than those without CAD. On further comparison between the two groups (subjects with CAD and without CAD), those with CAD had increased PSA than those without CAD, but after removal of subjects with BPH and/or risk factors, the association became non-significant. Comparison between the groups (subjects with CAD and without CAD), subjects with CAD had higher prostatic volume than without CAD and remained so even after removal of subjects with BPH and/or risk factors.

**Table 4: Comparison of parameters according to presence of CAD (among subjects without BPH without risk factors)**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Subjects with CAD (n=4)</th>
<th>Subjects without CAD (n=50)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>48.00±0.81 years</td>
<td>50.64±8.02 years</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean PSA</td>
<td>1.94±0.52 ng/ml</td>
<td>1.44±0.96 ng/ml</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean prostatic volume</td>
<td>28±1.63 cc</td>
<td>22.08±1.61 cc</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

BPH: Benign prostatic hyperplasia, CAD: Coronary artery disease, PSA: Prostate-specific antigen

**REFERENCES**


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Accuracy of Magnetic Resonance Cholangiopancreatography versus Endoscopic Retrograde Cholangiopancreatography in Pancreaticobiliary Disorders

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Abstract

Introduction: Magnetic resonance cholangiopancreatography (MRCP) is an alternative to diagnostic endoscopic retrograde cholangiopancreatography (ERCP) for investigating biliary obstruction.

Aim: The aim of the study was to compare the findings of MRCP with those of ERCP in pancreaticobiliary disorders.

Materials and Methods: Patients who were having a history of obstructive jaundice, pain abdomen, and cholangitis were included. 25 patients with these symptoms underwent MRCP using 1.5 Tesla Siemens symphony magnetic resonance imaging scanner. The results were compared with ERCP.

Results: Both MRCP and ERCP were fails to detect some type of causes. They are 4% cases of stricture and 20% cases of normal in MRCP. ERCP has failed in detecting cases in all most all the type expect calculus.

Conclusion: MRCP is able to determine accurately more cases than ERCP in both cause and extent of obstruction.

Key words: Biliary obstruction, Endoscopic retrograde cholangiopancreatography, Magnetic resonance cholangiopancreatography

INTRODUCTION

Biliary obstruction may be due to a variety of causes including choledocholithiasis, tumors, and trauma, including injury after gallbladder surgery, with choledocholithiasis being the most common cause. The prevalence of gallstones in England and Wales was 182/10,000 person years at risk. The incidence rate was 8/10,000 person years at risk for 1991-1992.¹ Patients with suspected biliary obstruction present with abnormal liver function and symptoms such as jaundice, pale-colored stools, dark urine, itching, abdominal pain in the upper right quadrant, fever, nausea, and vomiting. Endoscopic ultrasonography (EUS) is the first-line imaging investigation in patients with jaundice or right upper quadrant pain.² Although EUS is non-invasive, quick and inexpensive it is very operator and patient dependent. Magnetic resonance cholangiopancreatography (MRCP) is an abdominal magnetic resonance (MR) imaging method that allows non-invasive visualization of the pancreatic biliary tree and requires no contrast administration. This technique is a useful alternative to more invasive procedures like endoscopic retrograde cholangiopancreatography (ERCP), which should be used only in cases where intervention is needed. Single-shot fast spin-echo is a newer and more rapid MRCP sequence that can be performed in a single breath hold, thereby significantly reducing motion artifacts and increasing image quality.³-⁶
Aim
The aim of the study was to compare the findings of MRCP with those of ERCP in pancreaticobiliary disorders.

MATERIALS AND METHODS
This prospective observational study was conducted in patients who were having a history of obstructive jaundice, pain abdomen, and cholangitis at tertiary care center. 25 patients were included in the study. The study group consisted of male and female patients, between the age of 26 and 58 years (with a mean age of 39 years). For all 25 patients per operative findings were obtained. The study was approved by the Institutional Ethical Committee. 25 patients with these symptoms underwent MRCP using 1.5 Tesla Siemens Symphony MRI Scanner. The results were compared with ERCP.

RESULTS
The study subjects consisted of 16 male and 9 female patients, between the age of 26 and 58 years (with mean age of 39.42 ± 6.19 years). 16 (53%) had the complaints of the obstructive jaundice, 12 (40%) had pain abdomen, and a small 5 (16%) had cholangitis.

Both MRCP and ERCP failed to detect some cases. They are malignant stricture - Klatskin tumor and normal cases (Table 1).

Both MRCP and ERCP were fails to detect some type of causes. They are 4% cases of stricture and 20% cases of normal in MRCP. ERCP has failed in detecting cases in all most all the type except calculus (Table 2).

DISCUSSION
ERCP is mainly used for diagnosing as well as treating abnormalities of the bile ducts and the pancreatic ducts such as gallstones, inflammatory strictures, and leaks. ERCP is considered a boon for the dilatation of the sphincter due to the advent of endoscopy allowing insertion of small metal stents in collapsed ducts. Fluoroscopy is used to check for blockages, lesions and stones. ERCP is also used for the treatment of obstructive jaundice, stricture of various bile ducts and pancreatic or gallbladder tumor. MRCP is more often used with a diagnostic point of view whereas ERCP is more often used for therapeutic purposes. MRCP is preferred as it is non-invasive and can help in diagnosing a particular condition. MRCP helps to visualize the bile and the pancreatic ducts as well as the surrounding soft tissues which are not possible in a person undergoing ERCP.

Gone is the days when people used to opt for basic operative procedures such as ERCP and MRCP have come up. ERCP is more expensive than MRCP but both the procedures are tremendously helpful to physicians to make an accurate diagnosis. ERCP cannot be done in persons who have undergone previous allergic reaction (anaphylaxis) due to the dye used or in persons who have a history of myocardial infarction. Clotting disorders are another set of conditions which do not allow employment of ERCP. MRCP cannot be opted for in persons who have undergone previous stent surgery or have a pacemaker implanted as the MR will interfere in the working of the pacemaker.

CONCLUSION
MRCP is a comparable diagnostic investigation in comparison to ERCP for diagnosing biliary abnormalities.
MRCP is able to determine accurately more cases than ERCP in both cause and extent of obstruction. Bile ducts proximal as well as distal to the level of obstruction are made out better by MRCP.

REFERENCES


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Optical Coherence Tomography Based Evaluation of Retinal Changes in Parkinson’s Disease

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Abstract

Introduction: Optical coherence tomography (OCT) is a non-invasive imaging technique routinely used to visualize and quantify the layers of the retina. Originally developed for retinal diseases and glaucoma, optical coherence tomography (OCT) allows direct visualization and measurement of the optic nerve head topography and of retinal nerve fibre layer (RNFL) thickness with micron-scale resolution. It can provide diagnostic information and quantitative data on biological tissues at high resolution of 10 μ. Parkinson’s disease (PD), the second most common neurodegenerative disease, is a progressive disorder with selective dopaminergic neuronal loss, mainly in the substantia nigra.

Materials and Methods: A total of 30 patients of PD and equal number of age and sex matched controls were subjected to evaluation of retinal changes (peripapillary retinal nerve fiber layer [RNFL] and central macular thickness [CMT]) using Zeiss Cirrus HD-OCT machine.

Results: Significant RNFL thinning was seen in patients of PD compared to age and sex matched controls. Marked thinning was seen in superior and temporal quadrants of the right eye (P = 0.002 and P = 0.008, respectively) and in all quadrants of the left eye with a P < 0.001. Patients with disease duration multiple sclerosis (MS) for more than 5 years showed significant RNFL thinning in the superior quadrant of the right eye (P < 0.005), however, no such changes were seen in rest of the quadrants of the right eye and left eye. Significant RNFL thinning was seen in the patients of MS without prior history of optic neuritis (P = 0.001).

Conclusion: Significant RNFL thinning was seen in patients of PD compared to the age and sex matched controls. The duration of PD also influenced the RNFL thickness as statistical strongly significant thinning (P < 0.001) was seen in both eyes of patients with disease of more than 5 years duration. However, no significant changes were seen in CMT in PD compared to the controls.

Key words: Central macular thickness, Optical coherence tomography, Parkinson’s disease, Retinal nerve fiber layer thickness

INTRODUCTION

Optical coherence tomography (OCT) is a non-invasive imaging technique routinely used to visualize and quantify the layers of the retina. It can provide diagnostic information and quantitative data on biological tissues at high resolution of 10 μ. As OCT is noninvasive, easy to obtain and highly reproducible, therefore it can be used as a marker of axonal loss and as an endpoint in clinical trials. Parkinson’s disease (PD), is the second most common neurodegenerative disease, is a progressive disorder with selective dopaminergic neuronal loss mainly in the substantia nigra.

It was first described by James Parkinson in 1817.² Visual symptoms are common in PD, and include reduced spatial contrast sensitivity, motion perception abnormalities, color deficiency, and visual hallucinations. Thinning of the retinal nerve fiber layer (RNFL), the inner retinal layer, and macular thickness have been documented in several small studies, and it has been proposed that this may correlate with loss of these dopaminergic cells and progression of functional visual abnormalities in PD patients.³-⁴ In vivo analyses of retinal layers in Parkinson’s have been done and the previous reports have been published stating retinal thinning however, more reports on the same and

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Month of Publishing : 08-2017

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from our country are lacking. The successful use of OCT in clinical trials indicates that OCT may provide a valid and reliable biomarker to tracing neurodegeneration within the retina and a primary outcome measure to detect the effects of new therapeutic strategies and follow-up of disease progression of PD and multiple sclerosis. Furthermore, this biomarker may be useful in identifying the disease early in the course so that early treatment can be started. This would be particularly valuable in settings where sophisticated neuroimaging is not available. However, retinal nerve fiber thinning has been found in PD in relatively small numbers of patients, and how the structural damage of the retina changes with disease process is not well understood. Further studies in larger series are needed to ensure reproducibility and to evaluate the possibility to define cutoffs that could serve clinical purposes. Hence, this study was conducted to study RNFL thickness and macular morphology in PD.

**Aim and Objectives**

To determine the role of OCT in evaluating retinal changes in PD.

**MATERIALS AND METHODS**

A prospective study involving 30 patients of PD and equal number of age and sex matched controls were subjected to evaluation of retinal changes (peripapillary retinal nerve fiber layer [RNFL] and central macular thickness [CMT]) using Zeiss Cirrus HD-OCT machine. Measurement of CMT and RNFL thickness was done in patients of PD and age and sex matched normal population. The PD patients were further subdivided into groups based on the duration of disease. The CMT and RNFL thickness were compared between these two groups as well.

**RESULTS AND ANALYSIS**

The data collected was entered and analyzed in Statistical Package for the Social Sciences version 20.0. The CMT and RNFL thickness were measured in patients of PD and the age and sex matched normal subjects.

**Age Distribution**

a. PD: Mean age of patient was 55.6 years. The maximum number of patients were between 51 and 60 years of age 18/30 (60%) and if the next group is also included it would amount to 26/30 (86.6%). This indicates that the usual age of patients of PD who attend an eye outpatient department range from 51 to 60 years and beyond. This is in consonance with the global prevalence.

b. The same is true with the control group (20/30 [66.6%] and 28/30 [93.3%]). This indicates that the study group and the control group have been well age matched in this study.

c. PD: The maximum numbers of patients were having disease duration of more than 5 years (18/30-60%).

**CMT**

a. PD: No significant change in CMT was found in PD patients when compared with the controls in both the eyes (two-tailed P = 0.37). This has been depicted in Table 1. Similar results were obtained in a previous study by Aaker et al. However, a previous study by Altintas et al. showed significant reduction in macular volume and thickness by OCT.

**RNFL Thinning**

a. Significant RNFL thinning was noted in PD patients when compared with age and sex matched controls. Table 4a emphasizes this point amply. This is statistically strongly significant with P = 0.001. The mean RNFL thickness in superior, inferior, and nasal quadrants of the right eye was 112.67 µ, 98.37 µ, and 126.23 µ, 124.12 µ, and 124.12 µ, respectively.

**Table 1: CMT in eyes of PD patients and control**

<table>
<thead>
<tr>
<th>Range of CMT</th>
<th>Normal subjects</th>
<th>PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-208 (%)</td>
<td>08 (13.3)</td>
<td>04 (6.6)</td>
</tr>
<tr>
<td>209-217 (%)</td>
<td>05 (8.3)</td>
<td>07 (11.6)</td>
</tr>
<tr>
<td>218-226 (%)</td>
<td>03 (5)</td>
<td>03 (5)</td>
</tr>
<tr>
<td>226-234 (%)</td>
<td>14 (23.3)</td>
<td>16 (26.6)</td>
</tr>
<tr>
<td>235-243 (%)</td>
<td>24 (40)</td>
<td>26 (43.3)</td>
</tr>
<tr>
<td>244-252 (%)</td>
<td>06 (10)</td>
<td>04 (6.6)</td>
</tr>
<tr>
<td>Total number of eyes</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Mean</td>
<td>211 µ</td>
<td>225.5 µ</td>
</tr>
<tr>
<td>Median</td>
<td>210.5 µ</td>
<td>220.5 µ</td>
</tr>
</tbody>
</table>

CMT: Central macular thickness, two‑tailed P=0.37, PD: Parkinson’s disease

**Table 2: Comparison of RNFL thickness (quadrant wise of the right eye) in PD patients and normal subjects**

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Mean in normal subjects</th>
<th>Mean in PD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>125.20</td>
<td>112.67</td>
<td>0.001</td>
</tr>
<tr>
<td>Inferior</td>
<td>122.2</td>
<td>98.37</td>
<td>0.001</td>
</tr>
<tr>
<td>Nasal</td>
<td>70.07</td>
<td>64.63</td>
<td>0.026</td>
</tr>
<tr>
<td>Temporal</td>
<td>65.1</td>
<td>67.53</td>
<td>0.105</td>
</tr>
</tbody>
</table>

RNFL: Retinal nerve fiber layer, PD: Parkinson’s disease

**Table 3: Comparison of RNFL thickness (quadrant wise of the left eye) in PD patients and normal subjects**

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Normal subjects</th>
<th>PD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>108.34</td>
<td>126.23</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inferior</td>
<td>101.02</td>
<td>124.12</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Nasal</td>
<td>69.34</td>
<td>72.43</td>
<td>&lt;0.009</td>
</tr>
<tr>
<td>Temporal</td>
<td>57.14</td>
<td>66.15</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

RNFL: Retinal nerve fiber layer, PD: Parkinson’s disease
Singh, et al.: Optical Coherence Tomography Based Evaluation of Retinal Changes in Parkinsonism

Table 4b: RNFL in Parkinson's disease patients based on duration of disease - in right eye (quadrant wise)

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Mean RNFL (&gt;5 years duration of disease)</th>
<th>Mean RNFL (&lt;5 years duration of disease)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>86.12</td>
<td>130.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inferior</td>
<td>96.34</td>
<td>103.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Nasal</td>
<td>63.13</td>
<td>67.2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Temporal</td>
<td>66.5</td>
<td>67.24</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

RNFL: Retinal nerve fiber layer

Table 4c: Retinal nerve fiber layer changes in Parkinson's disease patients based on duration of disease - Left eye (quadrant wise)

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Mean RNFL (&gt;5 years duration of disease)</th>
<th>Mean RNFL (&lt;5 years duration of disease)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>81.45</td>
<td>120.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inferior</td>
<td>92.23</td>
<td>105.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Nasal</td>
<td>62.12</td>
<td>69.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Temporal</td>
<td>65.31</td>
<td>68.2</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

RNFL: Retinal nerve fiber layer

Diagram 4b: Retinal nerve fiber layer changes in the right eye (quadrant wise)

Diagram 4c: Retinal nerve fiber layer changes in the left eye (quadrant wise)

Table 4a: Distribution of PD patients based on duration of disease

<table>
<thead>
<tr>
<th>Disease duration</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5 years</td>
<td>12 (40)</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>18 (60)</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

PD: Parkinson's disease

64.63, respectively, compared to the controls (125.20, 122.2, and 70.07 microns, respectively). However, on comparing the RNFL thickness in the temporal quadrant of the right eye did not reveal any significant difference between PD patients when compared with age and sex matched controls (P = 0.105). Comparison of RNFL thickness in the superior quadrant, inferior, and temporal quadrants of the left eye revealed that mean RNFL of PD patient was 126.23, 124.12, and 66.15 μ and on comparing with the controls (108.34, 101.02, and 57.14 μ, respectively) statistically strongly significant difference was seen (P < 0.001). This is amply evident from (Tables 2 and 3). No significant difference was found between the two in the nasal quadrant. (P = 0.069). These findings are also similar to the findings obtained in few studies in the past which showed decreased RNFL thickness in PD patients when compared with the controls.6 No significant change in macular thickness was seen on 30 patients

of PD when compared with 30 age and sex matched control. Similar results were obtained in a previous study by Grant D Aaker et al. however, a previous study by Altintas et al.4 showed a significant reduction in macular volume and thickness by OCT. This study also shows that RNFL change also depends on the duration of PD. RNFL thinning in cases of PD was observed in those with disease of more than 5 years duration compared to those with duration <5 years. This was statistically strongly significant with a P < 0.001. Table 4b and c emphasizes this point amply however, this cannot be corroborated by previous research work due to paucity of the same. In this study, there is no difference with respect to age and sex and the study population is age and sex matched with normal subjects giving credence to the study.

CONCLUSION

Significant RNFL thinning was seen in patients of PD compared to the age and sex matched controls. Marked thinning was seen in superior, inferior, and nasal quadrants of the right eye and superior, inferior, and temporal quadrants of the left eye and is this is statistically strongly significant with a P < 0.001. The duration of PD also influenced the RNFL thickness as statistically strongly significant thinning (P < 0.001) was seen in both eyes of patients with disease of more than 5 years duration. In this study, no significant changes were seen in CMT in
PD compared to the controls which were corroborated by statistical analysis $P = 0.32$. Even though no significant changes were seen in CMT in PD compared to the controls, yet this study shows that OCT can be an effective tool in mapping of retinal changes in PD patients.

REFERENCES


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Prevalence Study on Heart Diseases among Antenatal Mothers

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Abstract

Introduction: Heart diseases complicating pregnancy accounts for about 0.2-4% of pregnant women. The spectrum of cardiac disease in pregnancy is changing and differs between countries. In the Western world, congenital heart disease is the most frequent cardiovascular disease present during pregnancy (75-82%), with shunt lesions predominating (20-65%). Rheumatic valvular disease is most predominant heart disease in non-western countries like India, comprising 56-89% of all cardiovascular diseases in pregnancy. Cardiomyopathies are rare.

Aim: The aim of this study is to estimate the prevalence of heart diseases among antenatal mother and to improve the outcome of pregnancy by early intervention.

Materials and Methods: This was a prospective observational study conducted among 1000 antenatal mothers attending outpatient department in the Department of Cardiology at Madras Medical College between January and March 2015. Informed consent was obtained from each patient. The patients were screened in non-randomized fashion and were evaluated by echocardiographic examination (using PHILIPS machine HD 7X [model2011]).

Results: Out of 1000 cases screened, 557 were primigravida, 405 were second gravida, and 38 were third gravida. Among 47 cases of abnormal heart conditions, 26 (55%) were congenital heart disease, and 19 (41%) cases were rheumatic heart disease. There was no statistically significant correlation between age and type of heart disease. Mitral stenosis tops the list of heart diseases in this study followed by atrial septal defect (ASD). Cardiomyopathy (CMY) and coronary artery disease (CAD) were rare.

Conclusion: The prevalence of heart disease among pregnant population was 4.7%. The prevalence of congenital heart disease was 2.6%. ASD (ostium secundum type) was the most common heart disease among congenital heart diseases - 30%. Prevalence of rheumatic heart disease was 1.9%. Mitral stenosis was the most common among rheumatic heart diseases - 73%. Prevalence data were significantly different from western and non-western data. CMY and CADs were rare 0.01%.

Key words: Echocardiogram screening, Heart diseases and pregnancy, Prevalence

INTRODUCTION

Antenatal mothers are the special population in which physiological changes can affect or alter the cardiac function. Hemodynamic changes occur, especially, with the second and third trimester and during and after delivery. Screening them for cardiac ailment is paramount importance so that they can be risk stratified, classified, and can have a better outcome and finally leading to reduction in maternal and infant mortality rate.

Careful history, physical examination, and non-invasive investigation such as electrocardiogram and transthoracic echocardiograms (ECHO) can diagnose heart diseases. Chest radiography, computerized tomography, and magnetic resonance imaging and radioisotope study will adversely affect the fetus, especially in the first trimester. Transesophageal ECHO is done only for cases of aortic
dissection in pregnancy. Severity assessments and scoring system help them to anticipate and avoid complications. Necessary precautions can be taken like advising infective endocarditis prophylaxis. Other management issues are addressed if new cases are diagnosed at the time of screening. Pregnancy outcome will be better if they are diagnosed early if not before pregnancy.

It is estimated that 0.2-4% of pregnant women in developed countries have cardiovascular diseases. Maternal heart disease is now the major cause of maternal death during pregnancy. In South India, 30% of maternal death is due to hemorrhage, 17% due to sepsis, and 13% due to hypertensive heart disorders. Among heart diseases, congenital heart disease accounts to 75-82% of cardiovascular deaths with shunt lesions predominating up to 20-65%. Rheumatic heart diseases dominate in non-western countries (56-89%), followed by congenital heart diseases (9-19%).

Changes in the demographic pattern are another reason. Various antenatal health programs help them to be referred for suspicious murmurs during routine clinical examination. Mostly, 97% of them may be functional murmurs. Among the few patients diagnosed with cardiovascular disease, 3 out of 4 turn out to be new cases. In the United Kingdom, between 2006 and 2008, the rate of maternal mortality due to cardiac disease was 2.31 per 100,000 pregnancies. Therefore, cardiac disease is the most common cause of indirect maternal deaths.

Predictors of maternal cardiovascular events are as follows:
1. Previous cardiac event
2. Baseline New York Heart Association (NYHA) Class II > or cyanosis
3. Mitral and aortic stenosis
4. Ejection fraction <40%
5. Mechanical prosthesis
6. Moderate-to-severe pulmonary hypertension
7. Dilated aorta >50 mm.

There is no prevalence data estimation of various diseases such as cardiomyopathies, coronary artery disease (CAD), and certain individual conditions among pregnant population. During pregnancy, a team approach is needed with consultations with obstetrician so that the mode, time, and place of delivery can be planned. For women with congenital heart disease, fetal ECHO is done at 22-26 weeks to screen them for congenital heart diseases.

Aims of Study
The aims of this study are as follows:
1. To screen antenatal mothers for cardiac diseases by transthoracic ECHO
2. To find out prevalence of cardiovascular disease among pregnant population
3. To classify the cardiac diseases complicating pregnancy
4. To separate high-risk cardiovascular conditions so that they can plan time, mode of delivery, and place of delivery
5. To assess the severity of stenotic lesions and advise them interventions if warranted before, during delivery, and after delivery
6. By finding new cases by ECHO, the management may differ infective endocarditis prophylaxis, anticoagulant management, and rheumatic fever prophylaxis can be advised on case basis
7. To study the change in demography and difference in prevalence by comparing with previously available data.

MATERIALS AND METHODS
All pregnant women referred to the cardiology outpatient department (OPD) were included; all ages and all gravida were included in non-randomized fashion. Prior consent was obtained before the study. The study was conducted from January 2015 to March 2015. A history of 4 cardinal symptoms was asked, physical examination done, and they underwent electrocardiogram and transthoracic ECHO.

Cardiac disease if diagnosed, they were subjected to detailed ECHO examination, and they were assessed for the severity of lesion and ventricular function assessed. Shunt if detected, the direction of shunt and presence or absence of pulmonary hypertension was noted. Focused ECHO examination was done for certain high-risk conditions. With the diagnosis, they were classified into four major group of heart diseases as congenital, rheumatic, cardiomyopathy (CMY), and CAD. Categorization was done according to the World Health Organization (WHO) classification, and they were referred back to obstetrician with appropriate advises regarding further management and follow-up.

Detailed transthoracic ECHO was performed using PHILIPS HD 7XE machine adult probe with 5 MHz for mother and pediatric probe with 8 MHz for fetal screening (only if mother has congenital heart disease). Structure and functional details such as chambers, valves, interatrial septum, interventricular septum, and other details are evaluated using two-dimensional, m-mode, 37 color-flow mapping, pulse-wave Doppler, continuous wave, and tissue dropper. ECHO dimensions referred with the ASE/ESC guidelines of ECHO.

Antenatal mothers with heart diseases both with and without a history of heart disease were taken into account,
and the prevalence was estimated for 1000 pregnant women. Individual conditions were subclassified into congenital, rheumatic, CMY, and CADs.

**Inclusion Criteria**
All pregnant women attending OPD who had been referred for cardiac evaluation as a routine irrespective of age, parity, and gestational age were included in the study.

**Exclusion Criteria**
- Cardiovascular diseases complicating pregnancy on admission.
- Rhythm disorders
- Hypertensive heart diseases
- NYHA Class IV
- Patients not willing to give consent.

**OBSERVATION AND RESULTS**

Out of screening of 1000 pregnant women, 129 cases (12.9%) were between 18 and 20 years, 508 cases (50.8%) were between ages 20 and 25 years, 301 were (30.1%) between 26 and 30 years, and 51 cases (5.1%) were between 31 and 35. There were 11 cases (1.1%) with age more than 35 years (Table 1).

Out of 1000 cases screened, 557 were primigravida, 405 were second gravida, and 38 were of third gravida. There was no gravida more than 3 in our observation (Table 2).

Among 1000 antenatal mothers screened, 953 were found to be normal. Among 47 cases of abnormal heart conditions, 26 were congenital heart disease, 19 cases were rheumatic heart disease, CAD was 1, and 1 case of CMY (Table 3).

Mitral stenosis tops the list of heart diseases among the 47 heart diseases followed by atrial septal defect (ASD), out of 1000 cases screened (Figure 1).

Newly diagnosed cases were 15 out of 26 congenital heart diseases (58%) and 9 out of 19 cases (47%). Among congenital heart diseases, 11 (42%) were old cases and 11 (58%) were new cases. Among rheumatic heart diseases, 10 (53%) were old cases and 9 (47%) were new cases (Table 4).

**DISCUSSION**

The prevalence of heart disease is available in various literatures for the general population. CAD is commonly seen problem in general population. However, in special population such as pregnant females, the prevalence of heart disease is estimated to be between 0.2% and 4.0% in the western population.

Indian data are not available on the prevalence of heart disease among pregnant women. Among the investigations, to diagnose heart disease after electrocardiogram, ECHO

<table>
<thead>
<tr>
<th>Table 1: Age frequency</th>
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<tbody>
<tr>
<td>Age in years</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>18-20</td>
</tr>
<tr>
<td>21-25</td>
</tr>
<tr>
<td>26-30</td>
</tr>
<tr>
<td>31-35</td>
</tr>
<tr>
<td>Above 35</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Primi</td>
</tr>
<tr>
<td>Gravida 2</td>
</tr>
<tr>
<td>Gravida 3</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3: Type of heart disease distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification of heart disease</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>CHD</td>
</tr>
<tr>
<td>RHD</td>
</tr>
<tr>
<td>CAD</td>
</tr>
<tr>
<td>CMY</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

CHD: Coronary heart disease, CAD: Coronary artery disease, RHD: Rheumatic heart disease, CMY: Cardiomyopathy

<table>
<thead>
<tr>
<th>Table 4: Old cases and new cases distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>CHD</td>
</tr>
<tr>
<td>RHD</td>
</tr>
<tr>
<td>CMY</td>
</tr>
<tr>
<td>CAD</td>
</tr>
</tbody>
</table>

CHD: Coronary heart disease, CAD: Coronary artery disease, RHD: Rheumatic heart disease, CMY: Cardiomyopathy

![Figure 1: Types of heart disease among 47](image-url)
remains to be an easy and inexpensive modality of choice even though it is not routinely offered for asymptomatic pregnant women. It is appropriate only in those who are known case of heart disease or in symptomatic patients or in patients referred by an obstetrician.

ECHO may show an increase in size throughout gestation; the right-sided chambers increase in size by 20% and the left atrium and left ventricle by 12% and 10%, respectively. At term, enlarged uterus may push structures leading to the appearance of posterior wall motion. There may be minimal pericardial fluid collection, and it is not pathological. Since pregnancy is a high-output state, the velocities across valves may be accentuated, and mild lesions may appear more than mild.

Prevalence is estimated for all heart diseases excluding hypertension, acute case, and rhythm disorders in the present study. We included bicuspid valve and mitral valve prolapse also in our study since they are associated with significant stenosis or regurgitation. According to available data, congenital heart diseases in general population is 19 per 100,000 including these two. If excluded, it is estimated as 8 per 1000 live births.

We have estimated in our study that 26 per 1000 pregnant women had congenital heart diseases and it accounts to about 55% of all heart diseases. In western data, it is 75-82% with shunt lesions predominating (20-65%).

Prevalence of heart disease among antenatal mothers is shown in Figure 2. There is a significant difference in the prevalence between the general population and pregnant population as for as congenital heart diseases are concerned. Among the congenital heart diseases, operated cases were estimated to be 35% (9/26).

Ostium secundum ASDs are the most common congenital heart disease which account to about 46% of congenital problems. Operated cases had average tricuspid regurgitation pressure gradient of 38 mm Hg. About 2% of congenital heart diseases are due to ventricular septal defects. There are no patent ductus arteriosus in our study. Ligated patent arteriosus cases in childhood are 2 in number (0.07%).

Mitrval valve prolapse accounts to 5% of general population; in our study, it is 0.03%. This may be due to addition of those with significant regurgitation only and omission of those with only prolapse.

Double-chambered right ventricle and ventricular septal defect with pulmonary stenosis who underwent intracardiac repair at 12 years had residual pulmonary gradient of 30 mm of Hg. Such complex case accounts to 1 per 1000 pregnant (0.01%).

There were no cases of device closures for shunt lesions. This may be because of lack of availability and lack of knowledge about the procedure among the public.

Rheumatic heart disease was 19 per 1000 in our study, which accounts to 40% of total heart diseases. Among them, 14/1000 were due to mitral stenosis which accounts to 74% of rheumatic heart disease. There were no cases that underwent balloon mitral valvotomy. This may be due to the learning curve in the practice of cardiology. Closed mitral commissurotomy was done in 2010 in 1 case, and she had residual moderate mitral stenosis with a valve area of 1.4 cm².

Two cases with prosthetic valve were diagnosed, and they were labeled as high risk as per the WHO risk stratification. They were implanted with TTK Sri Chithra valve. The gradients were slightly higher than the post-operative value. There were no vegetations and pannus. There was no perivalvular and paravalvular leaks. They showed mild pulmonary hypertension.

Newly diagnosed cases were 15 out of 26 congenital heart diseases (58%) and 9 out of 19 cases (47%). This is high when compared to available data from other center who published in 2013, they were estimated it to be 30%. In some other study, it was mentioned as three-fourth of cases were newly diagnosed cases.

In western data, rheumatic heart disease is <10% among heart diseases in general population. In the western countries, it is estimated to be between 59% and 86% in the pregnant population. The prevalence in our study (40%) is lower than the non-western pregnant population. This may be due to development in the socioeconomic status and educational status and small family norm adopted by the society.

The median age among 1000 pregnant women screened was 23 years. This may be because of local custom to go for marriage at roughly around 21 years. There is no multigravida >3, an additional observation in our study which has some public health and social implication.
CONCLUSION

- Prevalence of heart disease among pregnant population is 4.7%
- Prevalence of congenital heart disease is 2.6%
- ASD ostium secundum type is the most common heart disease among congenital heart diseases - 30%
- Prevalence of rheumatic heart disease is 1.9%
- Mitral stenosis is the most common among rheumatic heart diseases - 73%
- Prevalence data are significantly different from western and non-western data
- CMY and CADs are rare 0.01%.

LIMITATION OF THIS STUDY

This study does not include acute cases, and the prevalence may be underestimated. In patients with heart disease, complicating pregnancy was not included. Both above can lead to underestimation. The prevalence in our study may imply urban population in the majority since our institution is a referral hospital. It may not be the distribution in general population. Patients were examined in non-randomized fashion.

ACKNOWLEDGMENT

A great many people made this work possible. My warmest respects and sincere gratitude to our beloved Prof. Dr. M S Ravi, Professor and Head of the Department of Cardiology, Government General Hospital, Chennai, who was the driving force behind this study. However, for his constant guidance, this study would not have been possible. I am indebted to Prof K Meenakshi, Prof. D Muthukumar, Prof. N Swaminathan, Prof. G Ravishankar, and Prof. G Justin Paul, Dr. G S Sivakumar, Dr. T R Hemanth, Dr. R Ramesh, and Dr. S Sathish Kumar without whom much of this work would not have been possible. I acknowledge Dr. S Venkatesan and Dr. G Prathap Kumar, for the many useful comments made during this project. In addition, I am grateful to Dr. G Gnanavelu, Dr. G Palanisamy, Dr. Murthy, Dr. Arumugam, Dr. C Elangovan, Dr. Rajasekar Ramesh, Dr. G Murugan, Dr. G Manohar, Dr. S Saravananababu, Dr. B Balaji Pandian, Dr. C Elamaran, and Dr. Nageshwaran for their guidance. I also thank all my patients for their kind cooperation.

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Inherited Bleeding Disorder: A Prospective Study

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Abstract

Introduction: Inherited bleeding disorders are relatively rare genetic disorders characterized by increased or prolonged bleeding due to abnormal coagulation (the ability of the blood to clot).

Aim: To study the various inherited bleeding disorders and to study about the clinical features among these disorders.

Materials and Methods: In this prospective study, patients who are admitted in Tirunelveli Medical College Hospital in hemophilia society were included. Clinical features of all these patients were undertaken to study their prevalence among these disorders.

Results: Out of these 70 patients with inherited bleeding disorders, 87% have Factor VIII deficiency, 8% have Factor VIII deficiency with inhibitor, 4% have Factor IX deficiency, 7% have von willebrand factor deficiency, and 5% have others such as Factor V deficiency, and Factor XIII deficiency.

Conclusion: Management of patients with inherited bleeding disorders should reflect knowledge of the specific disorder to be treated plus careful consideration of the clinical circumstance for which therapy is proposed. In all cases, once a decision to treat has been made, the safest efficacious therapy should be given.

Key words: Bleeding, Coagulation factors, Hemophilia

INTRODUCTION

Inherited bleeding disorders are relatively rare genetic disorders characterized by increased or prolonged bleeding due to abnormal coagulation (the ability of the blood to clot). The cause is a decrease in amount or function of one of the 11 proteins in the blood, called clotting factors, that work together to make the blood clot. Inherited bleeding disorders lead to a lifelong bleeding tendency. Diagnosis, frequently made in childhood, is based on clinical presentation of bleeding and family history together with the laboratory tests. Hemophilia A and B are the most frequent of these disorders. Together with von willebrand’s disease (vWD), these X-linked disorders comprise 95%-97% of all inherited bleeding disorders. The remaining defects, generally transmitted as autosomal recessive traits in both sexes are rare with low prevalence rate. However, in countries where consanguineous marriages are relatively common, these autosomal recessive disorders occur more frequently in homozygosity. These inherited bleeding disorders occur in mild, moderate, and severe forms depending on the plasma factor levels of 6-30%, 1-5%, and <1%, respectively. While some patients may only have mild bruising or bleeding following trauma, others with severe deficiency may exhibit intracranial hemorrhages and hemarthroses. With the exception of vWD, these disorders produce similar signs and symptoms, regardless of the particular factor that is lacking.

Aim

The aim of the study was to study the various inherited bleeding disorders and to study about the clinical features among these disorders.

MATERIALS AND METHODS

In this prospective study, patients who are admitted in Tirunelveli Medical College Hospital in hemophilia society were included.
Exclusion Criteria
Patients with other acquired causes of bleeding disorders, patients with bleeding disorders associated with fever and liver diseases. Detailed medical history and physical examination of the patients were taken. Clinical features of all these patients were undertaken to study their prevalence among these disorders.

RESULTS
In this study, detailed data collection of 70 patients from hemophilia society was taken into account and following conclusions are made. 37% patients were from 11 to 20 years age group followed by 21 to 30 years 26% (Figure 1). 93% of patients were male, 7% were female. (Figure 2). Out of these, 70 patients with inherited bleeding disorders, 87% have Factor VIII deficiency, 8% have Factor VIII deficiency with inhibitor, 4% have Factor IX deficiency, 7% have von willebrand factor deficiency, and 5% have others such as Factor V deficiency, and Factor XIII deficiency (Figure 3). Out of these, 70 patients with these inherited bleeding disorders, 50% have knee joint hemarthrosis, 25% have elbow joint hemarthrosis, 4% have subdural hematoma, 13% have psoas hematoma, 4% have gum bleeding, and 4% have hematuria (Figure 4).

DISCUSSION
Hemophilia can be referred to as a disorder that causes joint damage leading to limitation in conducting daily activities and changes in social functioning. In developed countries, hemophiliacs have a quality of life very similar to that seen in general population due to the provision of safety factor concentrates and a multidisciplinary comprehensive care approach. In the opinion of the author, in developing countries like Pakistan, hemophiliacs are not treated with safe products and appropriate quantities of the products because of cost related issues. Hence, the lack of adequate treatment can result in pain, arthropathy, and disability. It is estimated that only 25% of all hemophiliacs around the world receive adequate treatment and most of them die before the age of 20. Despite financial limitations, some developing countries such as Chile, Iran, Venezuela, and Vietnam are optimizing their resources for hemophilia care.

Estimations based on the World Federation of Hemophilia annual global surveys indicate that the number of people with hemophilia in the world is approximately 400,000.
Hemophilia A is more common than Hemophilia B, representing 80-85% of the total hemophilia population. Hemophilia generally affects males on the maternal side. However, both F8 and F9 genes are prone to new mutations, and as many as 1/3 of all cases are the result of spontaneous mutation where there is no prior family history.

CONCLUSION

For each phase of hemostasis, screening tests which help in distinguishing a platelet disorder from a coagulation defect are available. The approach to a patient with a bleeding disorder needs a comprehensive detailed history and thorough physical examination. There must be a logical systematic approach and a discriminate use of laboratory investigations to reach the diagnosis and assess severity.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Vocal Handicap Index Measurement as a Tool in Evaluation of Patients with Voice Disorders

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Abstract

Background: Benign lesions of the vocal cords and functional dysphonia cause voice changes in patients. Endoscopic evaluation helps in anatomical diagnosis, but functional assessment and subjective evaluation by the patient makes it efficient to assess the patient satisfaction and effect of different treatment modalities used.

Aim: The aim of this study is to use vocal handicap index (VHI) as a tool to assess the degree of functional deviation in patients with voice disorders.

Materials and Methods: A total of 82 patients with different organic (55) and functional lesions (27) of the vocal cord were included. The diagnosis was based on the endoscopy of the larynx and measurement of vocal handicap (VHI) in both organic lesions and functional dysphonia, and a subjective questionnaire filled by the patient including the VHI and the quality of life index (QoLI) (a measure of voice-related QoL).

Observations and Results: A mean score of 65.3 on VHI of organic lesions of vocal cords and 58.6 in patients with functional dysphonia at the time of diagnosis were noted. The QoLI scores were 21.2 and 19.4, respectively, before treatment. Following different treatment modalities, the scores were 36 among non-functional lesions and 32 among functional dysphonia were noted. Similarly, the QoLI scores were improved to 59 and 53, respectively.

Conclusion: VHI scores and QoLI scores help in assessing the impact of incapacity caused by voice disorders on work performance and associated social and emotional impacts on patients. VHI also helps in assessing the effect of treatment modalities on voice disorders.

Key words: Vocal cords, Dysphonia, Speech disorders and Vocal handicap

INTRODUCTION

Patients attending the ENT departments are usually evaluated by endoscopy to rule out organic lesions of vocal cords and objective measures of the degree of vocal incapacity. Very few centers adopt a subjective self-assessment of the voice by the patients to know the extent to which the vocal incapacity affects their social functioning and quality of life (QoL). In any given treatment, important determinant of treatment efficacy is the patient’s perception of improvements in his/her vocal capacity. Vocal incapacity in patients has wide implications on their work depending on the importance of their voice in work. In a professional singer, slight variation in the tone of the voice may affect their professional work when compared to a subject with least voice demands. A benign lesion of the vocal cord in a professional singer or teacher may lead to stop the work, and the resulting impact on QoL cannot be effectively measured by objective measures alone. Self-assessment instruments which are ideally effective for a wide range of types of disorders and evaluate specific aspects of voice in different social and professional groups are used nowadays. Older adults tend to be concerned about loudness, teachers fear about “losing their voice,” and singers are worried about voice quality. The pre-treatment evaluation procedure aims at determining the initial voice handicap in patients with voice disorders. Even though the procedure adopted is
not in law in the USA or UK, it includes a detailed study of clinical record, physical examination including objective measures of voice, and estimation of general and voice-related QoL (VRQoL) using questionnaires such as the voice handicap index (VHI), the voice outcome survey, the voice symptoms scale, the VRQoL index, and the QoL index (QoLI).\textsuperscript{1,3,4} Jacobson developed the currently used VHI in 1998\textsuperscript{5} which are being widely used instruments for the evaluation of patient-perceived vocal incapacity. It consists of patient’s self-report questionnaire having three subscales covering the functional, organic, and emotional aspects; each with 10 questions. It explores the effects of the voice disorder on daily activity; the organic subscale explores the patient’s perception of the characteristics of his/her vocal production, and of laryngeal discomfort; the emotional subscale explores the patient’s effective responses to the problem. The test is applicable to all types of vocal disorders and has been statistically validated. On the other hand, the guidelines for the evaluation of permanent impairment of the American Medical Association, in its sixth edition published in 2008, consider problems of voice and speech as a single problem.

**Aim**

The aim of this study is to use vocal handicap as a tool to assess the degree of functional deviation in patients with voice disorders who use their voice as a profession.

**MATERIALS AND METHODS**

A total of 82 patients attending the OPD of Government ENT Hospital, Kotti, Hyderabad, attached to Osmania Medical College were included in the present study. The study period was between April 2013 and March 2015. An institutional ethical committee clearance was obtained before the commencement of the study.

**Inclusion Criteria**

1. Patients aged above 20 years and below 57 years were included.
2. Patients of professional voice users were included.
3. Patients of both the sexes were included.
4. Patients with both organic lesions and functional dysphonia were included.

**Exclusion Criteria**

1. Patients below 20 years and above 57 years were excluded.
2. Non-professional voice users were excluded.
3. Patients who have undergone minor or major laryngeal surgeries were excluded.
4. Patients with blunt injuries to the larynx were excluded.
5. Paralytic conditions of the larynx were excluded.

All the patients were elicited with detailed history, initial ENT examination, and video-laryngoscopy was performed. Laryngeal stroboscopy was performed in all the patients. The final diagnosis was based on the endoscopy of the larynx and measurement of vocal handicap index (VHI) in organic lesions and with a subjective questionnaire filled by the patient including the VHI and the QoLI (a measure of VRQoL). All patients filled up a questionnaire in Telugu version of the VHI and the QoLI. The 30 questions on the VHI are answered on 5-point scales (0: Never, 1: Hardly ever, 2: Sometimes, 3: Almost always, and 4: Always). For each patient, the score was calculated on each of the three subscales and total score. The QoLI developed by Wilson et al.\textsuperscript{6} comprises 6 questions designed to assess the participant’s perceptions of symptom severity and effects on QoL; the questions are answered on 6-point scales (0: Never to 5: Always).

**OBSERVATIONS AND RESULTS**

Among the 82 patients, 55 were found to have organic vocal cord lesions and 27 were with functional dysphonia. There were 49 male patients and remaining 33 were female (Table 1). The youngest patient was 20 years old, and the eldest patient was 56 years with a mean age of 35.64 ± 2.30. Among 55 organic disease patients of the vocal cords, 13 were in the age group of 20-35, 25 were in 36-41 years, and 17 were in 42-57 years age groups. Among 27 functional dysphonia patients of the vocal cords, 6 were in the age group of 20-35, 11 were in 36-41 years, and 10 were in 42-57 years age groups (Table 2). The mean age was 39.12 ± 2.20 among the organic disease patients and the mean age was 31.50 ± 1.30 in functional dysphonia patients. The different benign conditions of the vocal cords observed in the present study are illustrated in Table 3. The different functional dysphonia patients observed is illustrated in Table 4.

In both the groups of voice disorders, organic and functional dysphonia, the measurement of VHI indicated that most

<table>
<thead>
<tr>
<th>Observation</th>
<th>Non-functional diseases of vocal cord (n=55)</th>
<th>Functional diseases of vocal cord (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male - 49</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>Female - 33</td>
<td>16</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Non-functional diseases of vocal cord (n=55)</th>
<th>Functional diseases of vocal cord (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-35</td>
<td>13</td>
<td>06</td>
</tr>
<tr>
<td>36-41</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>42-57</td>
<td>17</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 1: The gender incidence (n=82)

Table 2: The age incidence (n=82)
patients show significant voice deficits on the functional, organic, and emotional subscales. In both groups of patients, the organic subscale showed gross affection, followed by the functional and then the emotional domains. Likewise, the QoLI indicated a marked effect of both pathologies on voice-related QoL, with a high proportion of patients complaining of symptoms associated with the vocal dysfunction (e.g. cough, need to clear throat, dry mouth, and odynophagia), with negative effects on QoL (Tables 5 and 6).

Following different treatment modalities, the scores were 36 among non-functional lesions and 32 among functional dysphonias were noted. Similarly, the QoLI scores were improved to 59 and 53, respectively.

**DISCUSSION**

The effect of organic diseases on the social well-being and emotional well-being was not considered in health sciences in the past. For the patients with voice disorders who use their voice extensively for professional earning, voice incapacitation represents a major problem. Few of these patients perceive their disorder as an alteration of critical capacity, causing emotional distress, and/or functional incapacity in social and work contexts. Hence, an ENT surgeon should be able to evaluate the degree of incapacity associated with the voice disorder in addition to the knowledge of various disorders causing voice change and their treatment. Smith et al in their study of 40 vocal nodule patients versus 200 normal participants with occasional voice symptoms found that vocal nodule patients gave a negative impact on their professional work due to the lesions 49%; 4% negative impact among the normal group. The capacity for work was found to be limited in 39% of the vocal nodule group when compared to 2% in the normal participants. The former group was concerned about their career in 78% versus 24% in the latter group. A similar study by Murry and Rosen observed that subjective evaluation by the patients before and after treatment are useful for gathering patients' opinions about the severity of their vocal dysfunction and the need for recovery of function and that the use of such measures allows more specific decision-making about treatment. Rosen and Murray in their study used VHI for evaluating the relative severity of vocal dysfunctions in 3 groups of patients (functional dysphonia, benign lesions of the vocal folds, and unilateral paralysis of the vocal folds) before and after treatment. They reported that patients with paralysis of the vocal folds gave highest self-evaluated handicap score (i.e. VHI score), both before and after treatment. This was followed by patients with functional dysphonia, and finally patients with benign lesions of the vocal folds, whose VHI scores were close to those seen in the general population. These authors concluded that the VHI is an

| Table 3: The incidence of different benign conditions of the vocal cords (n=55) |
| Benign conditions of vocal cords | Male (n=39) | Female (n=16) |
| Vocal nodules | 04 | 03 |
| Sulcus vocalis | 02 | 00 |
| Vocal polyp | 03 | 01 |
| Fibroma of the vocal cord | 04 | 01 |
| Cyst of the vocal cord | 02 | 01 |
| Fibroangiomas of the vocal cord | 05 | 03 |
| Non-specific laryngitis | 04 | 05 |
| Contact ulcer | 03 | 00 |
| Granuloma | 02 | 02 |
| Papilloma | 04 | 00 |
| Leukoplakia | 06 | 00 |

| Table 4: The incidence of different causes of functional dysphonia (n=27) |
| Functional dysphonia of vocal cords | Male (n=10) | Female (n=17) |
| Spasmodic dysphonia | 01 | 05 |
| Functional aphonia | 01 | 03 |
| Puberaphonia | 04 | 00 |
| Muscle tension dysphonia | 01 | 04 |
| Vocal cord bowing | 01 | 01 |
| Ventricular phonation | 01 | 01 |
| Hyperabduction | 01 | 03 |

| Table 5: The mean, median, and SD of non-functional vocal cord lesions (n=55) |
| Observation | VHI (total) | Functional subscale | Organic subscale | Emotional subscale | QoLI |
| Mean | 65.3 | 23.50 | 27.80 | 14.0 | 21.2 |
| Median | 63 | 21 | 24 | 13 | 19 |
| SD | 14.24 | 5.60 | 4.32 | 2.89 | 6.03 |

| Table 6: The mean, median, and SD of non-functional vocal cord lesions (n=27) |
| Observation | VHI (total) | Functional subscale | Organic subscale | Emotional subscale | QoLI |
| Mean | 58.6 | 21.43 | 25.65 | 13.22 | 19.4 |
| Median | 56 | 19 | 22 | 12 | 17 |
| SD | 11.40 | 6.34 | 5.40 | 3.12 | 6.32 |

SD: Standard deviation, VHI: Vocal handicap index, QoLI: Quality of life index
effective measure of vocal handicap. In a different case-control study by Rosen and Murray,9 in which the VHI was used to compare the self-assessed voice incapacity in 2 groups; Group A 106 singers (problem with singing without problem with spoken voice) and Group B 369 non-singers with voice problem. Mean VHI score differed significantly between the two groups. VHI also differed among the Group A subclasses of professional and amateur singers. Singers with vocal nodules showed lower mean VHI scores than singers with vocal cysts or polyps. He concluded that singers’ perceptions of incapacity could not be adequately measured by visual or objective measures, whereas the VHI effectively identifies the singer's degree of incapacity and specific needs, which may be significant even though the objective deficit in vocal quality is only very slight. Hsiung10 measured the VHI in 79 dysphonic patients with different vocal disorders and found that the organic subscale was the most severely affected. He concluded that the VHI is a useful tool for obtaining the patient's assessment of his/her voice deficit in terms of functional, organic, and emotional impacts. Thus, it helps the phoniatrist to design treatment programs that respond to each patient’s specific needs. In a different study by the same author, Hsiung11 reported that each subscale of the VHI has high reliability (P < 0.01), but that there was a major discrepancy between the VHI results and the results of objective laboratory measures of voice quality. He concluded that due to the large discrepancy between the results of VHI and objective laboratory measures, no objective parameter can be definitely regarded as a prognostic factor in the evaluation of dysphonic patients.

CONCLUSIONS

Organic and functional dysphonia often causes significant incapacity in professional voice users affecting their work performance and social functioning. This would result in significant emotional impact. VHI and QoLI are useful tools in the accurate assessment of voice quality before and after treatment of voice disorders.

REFERENCES

Analysis of Outcome of Zygomatic Fracture Management

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Abstract

Introduction: The zygomaticomaxillary complex is an important functional and esthetic landmark of midface, and it provides prominence to the cheek.

Aim: The aim of this study is to evaluate the clinical and radiological features of zygoma fractures and to analyze the functional and esthetic outcome of zygoma fracture management.

Materials and Methods: This study includes 37 cases undergone zygomaticomaxillary complex fractures. Patients were divided into six groups according to Knight and North classification. Functional sequelae, namely, trismus and infraorbital anesthesia and esthetic sequelae, namely, malar asymmetry and orbital dystopia were recorded, and computed tomography (CT) scan of facial bones was done.

Results: Trismus was the most common symptom (67%). Malar asymmetry was the most common esthetic abnormality (83%). The predominant fracture type based on Knight and North was Group III (displaced but unrotated fracture) in 35% of patients. The most common procedure was 2-point fixation (35%). Post-operatively, trismus improved in 80%, infraorbital anesthesia in 63%, malar asymmetry in 64%, and orbital dystopia in 50%. The most common complication was plate extrusion.

Conclusion: Zygoma fractures result in significant functional and esthetic sequelae. Mode of management depends on clinical and radiological features. CT scan axial and coronal section of facial bones shows the severity of fractures not all patients need operative intervention.

Key words: Fracture Zygoma, Rigid internal fixation, Enophthoimos, Vertical dystopia

INTRODUCTION

The zygomaticomaxillary complex is an important functional and esthetic landmark of the midface, and it provides prominence to the cheek.¹ However, unfortunately, it is very vulnerable to injury because of its intrinsically prominent convexity. It forms an important junction between the skull and midface.² There are four bony attachments between zygoma and other facial bones: A superior attachment to frontal bone (frontozygomatic suture), a medial attachment to maxilla (zygomaticomaxillary suture), a lateral attachment to temporal bone (zygomaticotemporal suture), and a deep attachment to greater wing of sphenoid (zygomaticosphenoidal suture). When trauma occurs to the zygoma and results in fracture of all four suture lines, it is called as a tetrapod fracture.³ Based on the clinical features and X-rays and computed tomography (CT) scan of facial bones, the zygoma fractures are managed in different ways ranging from conservative management to internal fixation and bone grafts.² Zygoma fractures result in a range of deformities from cosmetic to functional disabilities. Cosmetic deformities being a loss of malar protrusion (malar flattening), orbital dystopia, ectropion, enophthalmos, exophthalmos, and decreased anterior facial width. Functional deformities range from difficulty in the mouth opening (trismus), infraorbital anesthesia, and diplopia.⁵

Aim

The aim of this study is to evaluate the clinical and radiological features of zygoma fractures and to analyze
the functional and esthetic outcome of zygoma fracture management.

**MATERIALS AND METHODS**

Patients with zygoma fractures who were admitted in trauma ward and then transferred to plastic surgery department after ruling out head injury and other major injuries were included in the study. X-ray skull anteroposterior, lateral, and sinus view before and after surgery. CT facial bones - coronal and axial sections. Exclusion criteria: Patients with major head injuries, multiple organ injuries. Pre-operative assessment: Patients admitted with facial injuries were evaluated clinically. The following clinical features were specifically sought to identify zygoma fractures. Clinical evaluation: Ocular findings, periocular ecchymosis extent, noted. Subconjunctival hemorrhage, particularly, lateral extent noted visual acuity, light reflex, field of vision, and ocular movements such as diplopia, ptosis, eye opening and closure, orbital dystopia, and ectropion. Presence of infraorbital anesthesia was noted. Mouth opening was examined by scale and recorded in mms. Orbital rim was palpated specifically at frontozygomatic suture and infraorbital rim at maxillozygomatic suture for stepping. Maxillary Buttress fracture is ruled out by per oral examination. Malar projection was assessed by looking downward the face of the patient from the head end. This finding was recorded after 5 days if there is periorbital edema. Ophthalmological evaluation was done at the ophthalmological department and clearance obtained before surgery. Neurosurgical opinion obtained and major neurological injury was ruled out before taking up for surgery.

Based on radiological findings, patients were grouped according to Knight and North classification. Group I - No significant displacement, fractures visualized on radiographs/CT scan. Group II - Arch fractures; inward buckling of the arch, no orbital or antral involvement. Group III - Unrotated body fractures; downward and inward displacement but no rotation. Group IV - medially rotated body fractures; downward, inward, and backward displacement with medial rotation (Figure 3). Group V - Laterally rotated body fractures; downward, inward, and backward with laterally rotated zygoma. Group VI - Complex additional fracture lines cross the main fragment (Figure 4). Based on clinical and radiological features, patients were assigned for surgery or conservative management. Conservative management was used in patients with no functional abnormalities, esthetically no significant deformity, Knight and North Type I, medically unfit cases for surgery. Indications for surgery include trismus, infraorbital anesthesia, significant malar flattening, orbital stepping, orbital dystopia, diplopia, increased facial width, and malocclusion due to associated fractures such as Knight and North Type II, IV, V, and VI.

**RESULTS**

In 37 patients studied, males were commonly affected (94%). The most common age group being 20-30 years (43%). Road traffic accident being the predominant cause. Most common symptom noted was trismus (67%). The most common sign was subconjunctival hemorrhage (100%). Most common esthetic abnormality noted was malar asymmetry (83%). The predominant fracture type in our patients was Group III (35%) of Knight and North. Least common type was Group II (5%) (Figure 1). Trismus occurred in all patients of Group II and Group V (100%). Infraorbital anesthesia commonly occurred in all Type IV patients (100%). Orbital dystopia was most commonly noted in Type VI (100%). Malar asymmetry commonly occurred in Type III, IV, V, and VI (100%).

Most common procedure performed was 2-point fixation with plate and screws (Figure 2). Post-operatively, malar asymmetry improved in 64% of patients (Table 1). Maximum improvement occurred in Type III (91%) and

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**Figure 1: Knight and North classification**

**Figure 2: Procedure performed**
least improvement in Type VI (50%). Infraorbital anesthesia improved in 63% of cases at 5-month follow-up. Maximum improvement occurred in Type VI (83%) and least in Type IV (40%). Trismus improved in 80% of cases. Maximum improvement occurred in Type II, III, and IV (100%), and least improvement occurred in Type V (25%). Orbital dystopia is the least improved sign (50%) of our cases (Table 2). The early complication was infection noted in 2 cases, late complication being malar asymmetry (36%), and plate extrusion in 2 cases. From the Tables 3 and 4, it is observed that the overall outcome is good in Type III and IV and moderate in Type V and VI which had severe injuries.

DISCUSSION

The outcome of zygomatic fractures after management is based on the recovery of functions, namely, adequate mouth opening, correction of diplopia, recovery of infraorbital anesthesia, and achieving an esthetically normal face by correction of malar asymmetry. In our study, over a period of 22 months, the above said functional and esthetic features have been analyzed following zygomatic fracture management. The assessment of outcome helps in forming a protocol for the management of zygoma fractures and pinpoints the deficiencies existing in the management and the need to improve the already evolving management techniques.

Rowe and Killey (1955) in an analysis of 629 cases of facial fracture noted 19.6% did not require surgery in our study conservatively managed cases were 10%.

Holt et al. reviewed about associated ophthalmic injuries and concluded that serious ophthalmic injuries resulting in blindness occurred in 3% of cases and incidence of blindness in our study was 5%.

Zingg et al., in their studies on orbital floor fractures after treatment with orbital floor implant, stated that diplopia persisted in 17% of cases and enophthalmos in 11% of cases. In our study, persistent diplopia was noted in 2 cases (5%).

Taicher et al., in their study, on infraorbital anesthesia, showed postoperatively 43% recovered sensation in 2-3 months, 70% in 3-5 months, and 90% in 7-9 months. 10% had residual numbness. In our study, over a mean follow-up of 6 months, 63% fully recovered from infraorbital anesthesia.

The separation at frontozygomatic suture was an important decisive factor in deciding about open reduction and internal fixation (ORIF). If separation was more than 2-3 mm, ORIF was carried out. Hence the pre operative Axial and Coronary CT of the facial bones required to decide about the line of management.

Rinehart et al.,11 neither single miniplate nor triple wire fixation was enough to stabilize zygoma against masseter muscle forces, recommended 2-point fixation using double miniplate across zygomaticofrontal and zygomaticomaxillary fracture lines that are sufficient to resist masticatory muscle forces.

Hence, in our study, we used 2-point fixation as the most common type of fixation and 3-point fixation for grossly comminuted Type VI fractures.

In our study, residual malar asymmetry was present in 36% of cases which clearly shows that more intraoperative imaging of fracture reduction is needed to ensure appropriate reduction and good malar symmetry. This can be done by intraoperative fluoroscopy or intraoperative

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**Table 1: Post-operative outcome**

<table>
<thead>
<tr>
<th>Functional sequelae</th>
<th>Total</th>
<th>Improved</th>
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<tbody>
<tr>
<td>Trismus</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Infraorbital anesthesia</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>Malar asymmetry</td>
<td>31</td>
<td>16</td>
</tr>
<tr>
<td>Orbital dystopia</td>
<td>14</td>
<td>7</td>
</tr>
</tbody>
</table>

**Table 2: Procedure versus outcome**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total cases</th>
<th>Malar protection improved (%)</th>
<th>Trismus improved (%)</th>
<th>Infraorbital anesthesia improved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation</td>
<td>12</td>
<td>9/10 (90)</td>
<td>9/9 (100)</td>
<td>3/6 (50)</td>
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<td>1P fixation</td>
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<td>2/2 (100)</td>
<td>2/2 (100)</td>
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<tr>
<td>2P fixation</td>
<td>13</td>
<td>6/13 (46)</td>
<td>7/13 (53)</td>
<td>8/11 (72)</td>
</tr>
<tr>
<td>3P fixation</td>
<td>2</td>
<td>1/2 (50)</td>
<td>1/2 (50)</td>
<td>1/2 (50)</td>
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**Table 3: Post-operative outcome of dystopia**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-operative</th>
<th>Improved</th>
<th>Percentage</th>
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</thead>
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<tr>
<td>I</td>
<td>0</td>
<td>0</td>
<td>-</td>
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<tr>
<td>III</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>V</td>
<td>2</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>VI</td>
<td>8</td>
<td>3</td>
<td>37</td>
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</table>

**Table 4: Outcome based on Groups I-VI of Knight and North**

<table>
<thead>
<tr>
<th>Group</th>
<th>Trismus</th>
<th>IOA</th>
<th>Malar symmetry</th>
<th>Orbital dystopia (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>100</td>
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<td>III</td>
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<td>IV</td>
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<td>40</td>
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<td>50</td>
</tr>
<tr>
<td>V</td>
<td>25</td>
<td>50</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>VI</td>
<td>75</td>
<td>83</td>
<td>50</td>
<td>37</td>
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</table>

IOA: Infraorbital Anaesthesia
CONCLUSION

From our study, it is concluded that zygoma fractures are the most common facial fractures next only to nasal and mandibular fractures. Males are commonly affected and occur most commonly in the third decade. Pre-operative CT scan helps in classifying the zygoma fractures and deciding about the mode of management. Pre-operative ophthalmological, ear, nose, and throat, and neurosurgical opinion greatly facilitated the management. Not all patients require operative management.

REFERENCES

Profile of Dengue Fever in a Tertiary Teaching Hospital

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Abstract

Introduction: Dengue fever is mosquito borne arboviral infection which has emerged as a public health challenge in the past decade in a rapidly urbanising India. This study aims to document the clinical, laboratory and outcome profile in a tertiary teaching hospital in Madurai, South India.

Aim: To analyse the clinical profile and outcome of patients with dengue fever admitted at the Medicine wards in Government. Rajaji Hospital/Madurai Medical College, Madurai.

Materials and Methods: Prospective Observational study conducted during October-November 2012 in Government Rajaji Hospital, Madurai. 280 Patients who were Immunoglobulin M enzyme-linked immunosorbent assay positive for dengue were included in the study. Blood counts, ultrasonogram abdomen and other relevant investigations were done. Patients were treated with fluids, blood products and other necessary measures according to the clinical and laboratory picture.

Results: The incidence was higher and the clinical course was more severe in patients of younger age group. 62% of the patients had bleeding manifestations. The mortality rate was 2.5%

Conclusion: Sustained and effective vector control measures by the public health authorities, educating the public about vector control and seeking immediate medical attention, and para medical people about the warning signs of the disease may help in curbing the casualties of this potentially dangerous infection.

Key words: Dengue, Mortality, Sign and symptoms

INTRODUCTION

Dengue is the most widely distributed mosquito-borne viral infection of humans, affecting an estimated 100 million people worldwide each year.¹ Dengue is endemic throughout the tropical and subtropical zones between 30° and 40° S.¹ Rapid urbanisation, inadequate supply of piped water, increased movement of human population within and between countries, and further development

and spread of insecticide-resistance in the mosquito vector population, contribute to the increase of dengue transmission in recent years.²

The dengue virus (DENV) is a member of the genus Flavivirus in the family Flaviviridae, a single stranded enveloped RNA virus. There are four distinct and closely related serotypes (DENV1, DENV2, DENV3, DENV4).¹ Aedes aegypti is the most efficient of the mosquito vectors of dengue.¹ Aedes albopictus is a vector in some South east Asian countries.³ Other Aedes mosquitoes capable of transmitting dengue include Ae. polynesiens is, Ae. scutellaris complex.³ The mosquito can transmit dengue, either immediately by a change of host when its feeding is interrupted⁴ or after an incubation period of 8-10 days, during which time, the virus multiplies in the salivary glands. Once infected, the mosquito host remains infective for life (30-45 days).²
DENV infections can cause a wide clinical spectrum of disease, from a mild febrile illness known as ‘dengue fever’ through to ‘severe dengue’, previously known as dengue haemorrhagic fever (DHF). Dengue begins after an incubation period averaging 4-7 days, patient experiences sudden onset of fever, frontal headache, retro orbital pain, and back pain along with severe myalgias. Often a transient macular rash appears on the first day, as do adenopathy, palatal vesicles, and scleral injection. The illness may last a week, with additional symptoms and clinical signs usually including anorexia, nausea or vomiting, and marked cutaneous hypersensitivity. Near the time of defervescence on days 3-5, maculopapular rash begins on the trunk and spreads to the extremities and the face. Epistaxis and scattered petechiae are often noted in uncomplicated dengue, and pre-existing gastrointestinal lesions may bleed during the acute illness.

**Aim**

To analyze the clinical profile and outcome of patients with dengue fever admitted at the medicine wards in Government Rajaji Hospital, Madurai.

**MATERIALS AND METHODS**

This was a prospective observational study conducted at Government Rajaji (Medical College) Hospital, Madurai, India. 280 patients with Dengue fever admitted in the General Medicine wards of Government Rajaji Hospital, Madurai were studied. All adult fever patients who were positive for immunoglobulin M (IgM) dengue were included in the study. Haemoglobin, total white cell count, differential white cell count, platelet count, haematocrit were done. IgM dengue was done by enzyme-linked immunosorbent assay method for those who had 4 or more days of fever. Ultrasonogram abdomen and pelvis was done for those who had abdominal pain or melena.

**RESULTS**

The gender distribution was almost equal. 51% were male the rest were female. 200 out of 280 patients were <30 years old (71.4%). Around 50 patients were between 30 and 40 years old. The rest were older than 40 (Figure 1).

Among the 280 patients 155 persons (55.35%) had features of severe DHF. They had abdominal pain, vomiting, mucosal bleeding and giddiness in varying proportions (Figure 2).

Out of 155 patients who had severe dengue, 55% had abdominal pain, 41% had vomiting, 62% had mucosal bleeding and 36% had giddiness. Among 280 patients 136 persons had pulse pressure of more than 30 mmHg, 51 had pulse pressure of <20 mmHg.

54 patients had a haematocrit of 25-30. 68 patients had 31-35, 80 of them had 36-40, 78 had more than 40 (Figure 3).

Almost half (130) of the study population had a platelet count of <50,000/mm³. Around 80% of the 130 patients
had abdominal pain, and 70% of them had hypotension (Figure 4).

Upper gastrointestinal bleeding was the most common bleeding manifestation. Gum bleeding followed next (Figure 5).

Ultrasonography (USG) abdomen findings were as follows - 120 patients had normal USG. Polyserositis was there in 68 persons, ascites in 46, pleural effusion in 26 patients. Gall bladder wall edema was there in 10 patients.

108 patients were treated with fluids alone. 92 patients required blood/blood products transfusion (Figure 6).

Mortality
Out of 280 patients 7 died (2.5%). 5 of them were younger than 20 years. 2 persons were older than 20 years. 3 had severe dengue with encephalopathy, 2 had acute respiratory distress syndrome (ARDS), 2 patients had shock.

DISCUSSION

The clinical and demographic profile of dengue, an emerging and serious public health in India is changing in the recent decade. We chose to do this study during the monsoon season (October-December) - there is a conducive environment for the vector to multiply. There seems an increased incidence of cases during this season and it will be prudent to study the profile during this season.

In our study population of 280 IgM dengue positive patients, the majority were younger age group patients. More than 2/3rd of them were < 30 years old. This is comparable to the study by Singh et al., where the most exposed age group was 18-35 years.

Almost half of our study population had warning signs - the most common of them was abdominal pain followed by mucosal bleeding. Abdominal pain was the most common warning sign in the studies by Singh et al. and Deshwal et al.

72% (n = 202) of the patients had thrombocytopenia (<1,00,000/mm³) in our study. 89% of the patients in Singh et al. study population and 69% of patients in Deshwal et al. study had thrombocytopenia. 79% of patients had thrombocytopenia in Veerasekar et al. study.

78 persons had increased haematocrit (more than 40%) in our study (27.8%). 67% and 20.7% had increased haematocrit in Singh et al. and Deshwal et al. study respectively.

Gastrointestinal bleeding was present in 19% patients in our study. It was meagre in Singh's (3%) study.

As ours was an observational study there was not much deviation in our treatment approach - we followed the standard protocols advised by the Government of India and other expert guidelines with regard to fluid management, blood and blood products transfusion and antibiotics. We found that prophylactic antibiotics and prophylactic transfusion were not necessary. The outcome was poor in patients who sought admission later in the course of illness and in those with atypical manifestations.

The mortality in our study group was 2.5% (7 patients). All of them had severe dengue. Among them 2 patients had encephalopathy and 2 patients had ARDS. The mortality...
rate was comparable to Deshwal et al. study (mortality rate 0.77%) and Veerasekar et al. study (1.3%).

CONCLUSION

Dengue, a major public health problem worldwide, has emerged as a challenge to health care providers in India. In addition to the increased number of cases in rainy season, the disease is expected to soon attain the status of an endemic one. Sustained and effective vector control measures by the public health authorities, educating the public about vector control and seeking immediate medical attention, and para medical people about the warning signs of the disease may help in curbing the casualties of this potentially dangerous infection.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Comparative Study of Pedicled versus Skeletonized Left Internal Mammary Artery Graft in Coronary Artery Bypass Graft Surgery

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INTRODUCTION

Coronary artery disease (CAD) has emerged as a major health burden. There is a sharp increase in CAD incidence in the developing countries such as India. CAD has got multifactorial etiology. Coronary artery bypass graft (CABG) surgery is the important surgical procedure done in the history of CAD. CABG has prolonged the patients’ lifetime. Arterial revascularization provided long-term good results in CABG.

The internal thoracic artery (ITA) is the gold-standard conduit for coronary artery bypass surgery. Until recently, it was used almost exclusively as a pedicle, with construction of 1 distal anastomosis. Skeletonization of the ITA has recently been advocated to increase the number of arterial anastomoses and decrease the occurrence of sternal wound infections. When skeletonized, the vessel loses its “milieu,” which raises the question of whether this technique sacrifices the superior longevity of the conduit. The current status of research on the effects of skeletonization (depriving the ITA of vasa vasorum, innervation, and lymphatic and venous drainage, together with creating an imbalance between vasoconstricting and...
vasodilating substances) appears to support the superiority of the pedicled graft.

Long-term patency studies of the skeletonized ITA, with meticulous follow-up and confirmation by angiography, are not currently available.\textsuperscript{7-10} Theoretically, skeletonization of the ITA might adversely affect its long-term resistance to atherosclerosis. More data are needed before this technique can be universally recommended. If the skeletonized ITA has decreased long-term patency, bypass surgery may be at a disadvantage when compared with the new generation of drug-eluting stents.\textsuperscript{11,12}

**Aim**

This study is done to compare the clinical outcome of pedicled left internal mammary artery (LIMA) versus skeletonized LIMA.

**MATERIALS AND METHODS**

This study was conducted in the Department of Cardiothoracic Surgery (CTS) at Government Rajaji Hospital. Case selection for LIMA harvesting whether pedicled or skeletonized includes patients admitted in our CTS Department. LIMA harvesting was done by the same group of surgeons in our unit. Under general anesthesia after starting central venous and arterial line, with chest elevated, strict midline sternotomy or mild left sternotomy done. Thymus gland dissected or separated, and in some cases, it was excised.

Using LIMA retractor left sternum elevated, surgeon sits in a chair to harvest the LIMA. The table is adjusted in such a way that surgeon’s eye looks at the bottom of the left sternum. This position does not hinder other operating surgeon taking the vein grafts in legs.

Initially, it took 45-60 min to harvest LIMA. However, later on, the time taken was reduced to 20-30 min.

After identifying the proximal, middle, and distal portions of the LIMA, dissection is started at distal portion after making an incision 5 mm medial to the medial mammary vein for harvesting pedicled LIMA. LIMA Harvesting done by blunt and sharp dissection with diathermy at 10 desiccate mode. Pedicled LIMA graft includes fascia, muscles, mammary vein, and internal mammary artery. After dissecting the entire course of LIMA, heparin injected intravenously at a dose of 2 mg/kg body weight. After injection of heparin, LIMA is divided with proximal extent up to the first costal cartilage, still proximally up to the subclavian artery, distally up to the division of LIMA into superior epigastric artery, and musculophrenic artery up to the level of xiphisternal junction. LIMA branches are clipped flush with LIMA.

For skeletonized LIMA harvesting, we made an incision just adjacent to the LIMA, and parietal pleura is separated. Be viewing the underside of the LIMA alone, by holding the parietal pleura firmly, we can harvest the skeletonized LIMA without looking the mammary vein during the dissection.

The skeletonized LIMA harvested by blunt and sharp diathermy burst at 10 desiccate mode. We adopted this method of harvesting LIMA in all total 40 cases of our study. LIMA is kept in papaverine-soaked gauze until left anterior descending artery (LAD) is made ready for anastamosis.

**RESULTS**

Pedicled LIMA harvested in 18 cases and skeletonized LIMA harvested in 22 cases in our study of 40 patients and divided into 2 groups and followed up (Figure 1).

In our study group, male patients contribute the majority of cases around 82% with female patients 18%. Skeletonized LIMA harvested in 58% of male patients and pedicled LIMA harvested in 42% of male patients in our study group. Skeletonized LIMA harvested in 43% of female patients and pedicled LIMA harvested in 57% of female patients in our study (Table 1).

Majority of patients about 18 patients in our study belong to age group 61-65 years. 40-45 years age contribute only 2 cases (Table 2).

Initially, it took 45-60 min to harvest LIMA. However, later on, the time taken was reduced to 20-30 min. Initially, it took 45-60 min to harvest LIMA. However, later on, the time taken was reduced to 20-30 min.

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In the pedicled LIMA group, 15 patients had pain over the surgical site, and 5 patients have sternal wound infection (Figure 3).

![Figure 1: Pedicled versus skeletonized left internal mammary artery - number of cases](image-url)
Josephraj, et al.: Pedicled versus Skeletonized Left Internal Mammary Artery Graft

In the skeletonized LIMA group, 6 patients had pain over the surgical site, and only 1 patient has sternal wound infection (Figure 4).

**DISCUSSION**

CABG had become the most common surgery done in cardiothoracic departments all over the country. The ITA is the gold-standard conduit for coronary artery bypass surgery. We have taken 50 cases for our study initially, out of which 10 cases showed poor flow of LIMA intraoperatively so excluded from the study. Rest of 40 cases taken for the study. Pedicled LIMA harvested in 18 cases and skeletonized LIMA harvested in 22 cases in our study of 40 patients and divided into 2 groups and followed up. Male patients contribute majority of cases around 82% with female patients 18% in our study group.

In our study group, skeletonized LIMA harvested in 58% of male patients, and pedicled LIMA harvested in 42% of male patients, and skeletonized LIMA harvested in 43% of female patients, and pedicled LIMA harvested in 57% of female patients, in our study. Majority of patients about 18 patients in our study belong to age group of 61-65 years. 40-45 years age contribute only 2 cases. Initially, it took 45-60 min to harvest LIMA. However, later on, the time taken was reduced to 20-30 min. Average time for harvesting pedicled LIMA is 30 min and skeletonized LIMA is 45 min.

In the pedicled LIMA group, 15 patients had pain over the surgical site, and 5 patients have sternal wound infection. In the skeletonized LIMA group, 6 patients had pain over the surgical site, and only 1 patient has sternal wound infection.

Among the study group, 3 female patients and all of them are diabetic. One patient had LIMA to LAD and right internal mammary artery to ramus anastomosis done and discharged without any complications. All patients were subjected to echo evaluation periodically in the post-operative period for ejection fraction and motion wall abnormality of the left ventricle. Further follow-up echo done 3 months after discharge. Out of 40 patients, 6 had sternal wound infection (5 in the pedicled group and one in the skeletoned group), which were managed conservatively after pus culture and sensitivity and daily dressing and appropriate antibiotics given.

**CONCLUSION**

This study had proved that both pedicled and skeletonized LIMA graft in CABG has equal distal flow and better sternal wound healing in skeletonized LIMA group make this a choice in patients with increased chance of sternal wound infections. Even though skeletonized LIMA harvesting took more time than the pedicled LIMA harvesting, it has the advantage of less sternal wound complications post-operatively. Further analysis needed by doing check angiogram post-operatively to find out the adequacy of flow in these grafts. Long-term comparative studies are not available.
needed, with complete or near-complete angiographic and freedom from, reintervention data. Until prospective, randomized studies of pedicled versus skeletonized ITA grafts are conducted, with follow-up periods of 15-20 years, we cannot conclude that skeletonization does not adversely affect patency.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Incidence of Coronary Artery Anomalies among Patients Undergoing Coronary Angiography and its Relevance to Appropriate Choice of Coronary Catheter Selection - A Tertiary Care Center Study

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Abstract

Background: Coronary artery anomalies (CAA) are anatomical variations in coronary vessels associated with various symptoms such as angina, dyspnea on exertion, myocardial infarction (MI), and ventricular tachycardia. Primary congenital anomalies are rare. Lack of suspicion for these rare anomalies is a reason for the delay in proper management.

Aim: The aim of this study is to estimate the incidence of CAA.

Materials and Methods: This was a prospective, observational study conducted in Government Rajaji Hospital, Chennai for 1 year in patients undergoing coronary angiography.

Results: Incidence of coronary anomaly was 2.06% (32 cases) among 1547 patients. Common anomalies found were the anomalous origin of right coronary artery (RCA) from left coronary sinus (LCS) seen in 0.078% (12 cases), separate origin of left anterior descending (LAD), and left coronary artery from LCS is 0.71% (11 cases). Clinical presentation was acute segment elevation MI in 1.55 (24 cases), chronic stable angina in 0.13% (2 cases), and unstable angina in 0.06% (1 case). In most cases, coronaries were cannulated with routine Judkins right (JR) and Judkins left (JL) catheters. Percutaneous coronary intervention was done in 7 anomalous coronary artery patients.

Conclusion: Incidence of coronary anomalies in patients undergoing angiography in our study was 2.06%. The most common anomaly found was anomalous origin of RCA from LCS followed by separate origin of LAD and left circumflex artery. For selective cannulation and intervention routine, JR and JL catheter can be used in most of the patients.

Key words: Coronary artery anomalies, Incidence, Intervention

INTRODUCTION

Coronary artery anomalies (CAAs) reflect a range of anatomical variations including the origin, course, and termination of coronary vessels, which are not associated with complex congenital heart disease. CAA have been associated with numerous symptoms, such as angina, dyspnea on exertion, ventricular tachycardia, and myocardial infarction (MI).1-3 After hypertrophic cardiomyopathy, CAAs are considered to be the second major cause of death in young athletes.4-8

Coronary angiography has led to a better understanding of CAAs, since they are frequently detected as incidental findings. However, all CAAs neither do they produce symptoms, nor do they all lead to sudden cardiac death. Nevertheless, identification of these anatomical variants is important for the appropriate management of cardiac patients.

Primary congenital coronary anomalies present with a rate of approximately 1% (range: 0.6-5.6%) in various series.
The lack of suspicion for these rare anomalies is responsible for prolonged catheterization procedures and potential mismanagement of patients with acute cardiac disease. \(^9\) Angioplasty in such complex lesions poses a technical challenge. \(^{10}\) There have been reported cases of accidental ligation of an anomalous coronary artery during valve replacement procedures. \(^{11-13}\) In the era of biventricular pacing, the electrophysiologist must be aware of the coronary anatomy, as these anomalies could be related to variations in the venous system.

In India, apart from some case reports, \(^{14}\) there are no published data. Thus, the aim of the present study was to assess the incidence of CAA in patients undergoing coronary angiography and to also decide the appropriate choice of coronary catheter selection in the various common CAA that are seen in our population so as to reduce the unwanted prolongation of the procedural time, thereby reducing the amount of radiation exposure to the patient, Cath Lab Team, and the environment as a whole.

**MATERIALS AND METHODS**

**Aim and Objectives**
1. To assess the incidence of CAA in patients undergoing coronary angiography in 1 year.
2. To study clinical presentation of patients with CAA.
3. To describe the catheters that were useful in successful cannulation of the anomalous coronary arteries in relation to their origin.

**Study Population**
Consecutive adult patients >18 years of age undergoing coronary angiography in the Department of Cardiology, Government Rajaji Hospital, for 1 year.

**Inclusion Criteria**
1. Age ≥ 18 years
2. Patients for whom CAG was planned in our department, which includes acute coronary syndromes, chronic stable angina, and rheumatic heart disease (RHD) patients in 1 year.

**Exclusion Criteria**
1. Age < 18 years
2. Pre-existing cardiomyopathies
3. Pre-existing arrhythmias
4. Concomitant acute or chronic kidney disease.

**RESULTS**

In our study, incidence of coronary anomaly was found to be 2.06% (32 cases) among 1547 patients who have undergone coronary angiogram over 1 year. Various coronary anomalies found in our study is shown in Table 1 below. The most common anomalies found were:
1. Anomalous origin of right coronary artery (RCA) from left coronary sinus (LCS) in about 0.78% (12 cases),
2. Separate origin of left anterior descending (LAD) artery and left circumflex artery from LCS in about 0.71% (11 cases).
3. Other common anomalies found were:
   - Anomalous RCA from posterior midline 0.13% (2 cases),
   - Coronary arteriovenous fistula 0.06% (1 case),
   - Myocardial bridging 0.13% (2 cases),
   - Dual RCA 0.06% (1 case),
   - Both RCA and left coronary artery arising from common trunk from right coronary sinus 0.06% (1 case)
   - Anomalous origin of LMCA from midline 0.06% (1 case) and high origin of RCA 0.06% (1 case).

**DISCUSSION**

Variation in the origin, course, or distribution of the epicardial coronary arteries is found in 1-2% of the population. Certain types of these anomalies-including osteal lesions, passage of a major artery between the walls.
of the pulmonary trunk, a major coronary artery originating from the pulmonary trunk, or myocardial bridges—may produce ischemia with subsequent MI.

The incidence of coronary anomalies at routine autopsy series varies from 0.3% to 0.6%, whereas the incidence of major coronary anomalies, causing acute MI at autopsy (<35 years of age) has been reported as 4%.

Angiographically, the incidence of coronary arterial anomalies range from 0.6% to 1.55%.  

**CONCLUSION**

Incidence of coronary anomalies in patients undergoing angiography in our study was 2.06%. The most common anomaly found was anomalous origin of RCA from LCS followed by separate origin of LAD and LCX. For selective cannulation and intervention, routine JR and JL catheter can be used in most of the patients. If not possible, then either AL or AR can be used for anomalous origin of RCA from LCS. EBU catheter may also be useful in such circumstance.

**ACKNOWLEDGMENT**

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REFERENCES


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Punch Skin Graft in Stable Vitiligo: Donor and Recipient Site Changes - A Retrospective Study

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Abstract

Introduction: Punch skin graft procedure in the treatment of stable vitiligo is a simple and best office procedure.

Aim of the Study: The aim of the study was to evaluate the donor and recipient site changes occurred during the treatment of vitiligo with punch skin graft.

Materials and Methods: A total of 25 cases of vitiligo treated with punch skin graft with data and photographs were collected and analyzed retrospectively in the Department of Dermatology, Government Theni Medical College, Theni.

Results: Out of 25 cases of stable vitiligo, 9 were male and 16 were female. Donor site changes were noted as hypertrophic scarring, depigmentation, and hyperpigmentation. Out of 222 grafts placed, the graft uptake percentage was 77.8%. The mean pigment spread was 4.8 mm in non-glabrous area. Cosmetic improvement was 100% in mucosal vitiligo. Depigmentary joining line, peri-individual graft halo (target-like pigmentation), cobblestoning, graft rejection, crowding of grafts, and reactivation of vitiligo as recipient site changes were noted. Repigmentation of leukotrichia was noted. Overall cosmetic improvement was 70%.

Conclusion: If the selection of the stable vitiligo cases and the expertise of the operating surgeon are good, the donor and recipient site changes may be reduced to a greater extent to yield a better cosmetic result.

Key words: Stable vitiligo, Donor site, Recipient site

INTRODUCTION

Vitiligo is a common depigmenting disorder, characterized clinically by milky white macules, and histologically by an absence of functional melanocytes in the affected area. It causes severe cosmetic distress, particularly in darkly pigmented skins and is also associated with a great social stigma. It has a profound psychological impact and greatly affects the quality of life. In 1947, Haxthausen transplanted thin split thickness skin grafts from normal to vitiliginous skin in three cases, to study the pathogenesis of the disease. In 1964, Behl from India, was the first to describe the surgical treatment of vitiligo in a large series of 107 patients with thin Thiersch grafts. Falabella described the suction blister technique for repigmentation of vitiligo in 1971, and later the miniature punch grafting technique in 1978.

The basic principle of all surgical methods is transfer of melanocytes from uninvolved skin into a stable leukoderma lesion, where they grow into, and function as, effective epidermal-melanin units. “Donor dominance” principle states that when a graft from normal skin is transplanted to an affected site, the transposed grafted area maintains its integrity and characteristics, independent of the recipient site. When a normal pigmented donor auto punch graft is transplanted onto a depigmented stable vitiligo area, it dominates, and the melanocytes in the minigrafts not only continue to produce melanin but also migrate into the adjacent depigmented epidermis; seen clinically as initial perigraft pigmentation. When the graft is taken from the donor site, it is placed on the vascular bed in the recipient area. From this vascular bed, it derives its blood supply. Initially, the graft adheres to its new bed with the help of...
MATERIALS AND METHODS

A retrospective study was done in 25 cases of stable vitiligo underwent punch skin graft procedure. The cases done by the author were collected with case records and photographs and results were analyzed in the point of donor and recipient site changes. This study was done in the Department of Dermatology, Theni Medical College, Theni, Tamil Nadu.

A selection criteria was followed while selecting the cases for punch skin graft procedure.
1. “Stable vitiligo” which is stationary and without the development of new lesions in the last 2 years
2. Patients in whom the lesions were not improving in spite of long medical management
3. Patients with no history of Koebner’s phenomenon in the lesions
4. Patients who do not have keloidal tendency and
5. Patients with no history of bleeding diatheses.

The cases which had undergone the following methodology were selected for the study.

Donor site was selected as extensor aspect of thigh or gluteal region. Skin punches of 2.5 mm size are rotated till the cutting edge descends to the depth of upper dermis. At donor site, the punches are cut adjacent to one another keeping 1-2 mm of normal skin in between 5 and 10 parallel rows. Recipient site was the stable vitiligo patches. Skin punches of 2-mm size are rotated till the cutting end descends to the depth of mid-dermis, and the cuts are spaced 5-10 mm away from each other. In a single session, 5-10 or up to 50-60 grafts were taken and ensuring the dermal side of the graft down to the recipient site, all grafts were transferred and with a firm pressure a snug fit was achieved. Dressing was done with double layer of Framycetin Tulle, gauge, and Elastocrepe bandage. At recipient site, follow-up dressing was done after 24 h once to rule out the shift of grafts and next dressing after 8-10 days. At donor site, dressing was removed after 8-10 days. Photographs were taken prior and soon after the procedure with grafts in situ, at the end of 8-10 days and periodically after every 15 days for 2 months and there after every 1 month till the end of 1 year. Changes in the donor site were noted. In the recipient site, the number of grafts taken and rejected, the mean pigment spread (MPS), cosmetic improvement and disfigurement, and overall cosmetic improvement were noted and calculated. Cosmetic assessment was done in relation to the age, sex, type, and site of vitiligo at the end of 12 months by a single-blind observer. It was graded as excellent 91-100%, good 71-90%, fair 51-70%, and bad with <50% improvement.

RESULTS

Out of 25 cases of stable vitiligo, 9 were male and 16 were female. Young females were more in the below 20 years age group. Lowest age was 12 years and upper limit was 50 years (Table 1). On evaluating the types of vitiligo, 15 cases were focal vitiligo, 6 cases were segmental vitiligo, 2 cases were mucosal vitiligo, and 2 cases were acrofacial type (Table 2). Donor site changes were noted as hypertrophic scarring in 21 cases (84%) (Figure 1), depigmentation of grafts in 1 case (4%) (Figure 2), and hyperpigmentation in 1 case (4%) (Figure 3) were noted.

No scarring was seen in two patients (8%) in the age of 43 years and 50 years (Table 3). 222 were grafts and were grafted in 15 sites. In focal vitiligo, out of 84 grafts placed, 79 grafts were taken (97%) and 5 rejected. In segmental vitiligo, out of 117 grafts placed, 90 (77%) grafts were taken while 27 rejected. In mucosal vitiligo, out of 6 grafts placed, 5 (83%) grafts were taken and 1 graft rejected. In acrofacial

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Table 1: Age and sex distribution

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Table 2: Type of vitiligo

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Table 3: Donor site changes (n=25)

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<td>21</td>
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<td>Hyperpigmentation</td>
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<td>No scarring</td>
<td>43 and 50</td>
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vitiligo, out of 15 grafts placed, 8 (54%) grafts were taken and 7 rejected. Average graft uptake percentage was 77.8% (Table 4). The pigment spread in mm was calculated from the grafts placed in 15 sites. In non-glabrous (hairy skin), 9 mm spread was seen in one scalp case (Figure 4), forehead (1 case), nose (2 cases), cheek (3 cases), and mandibular area (1 case) (Figure 5) showed 4.5 mm spread as an average. Upper interscapular and back (2 cases) showed 3-mm spread. In parasternal area, 7 mm (1 case) (Figure 6), lumbar 3 mm (2 cases), leg hairy area 3 mm (1 case) spread.
were noted with a MPS of 4.8 mm in non-glabrous area. Two mucosal area cases showed 3-mm pigment spread as an average. In Glabrous skin, the pigment spread was noted as 2.5 mm in 2 cases of dorsum of hand, 2 mm in 2 cases of fingers, 4 mm in 2 cases of leg-medial malleolus and 3 mm in 1 case of foot. Pigmentation of grafts alone was noted in one case of leg. The average MPS was calculated as 2-3 mm (Table 5).

In recipient area, cosmetic disfigurement was noted as depigmentary or hypopigmentary joining line/perigraft halo in 9 cases (36%) (Figures 5 and 6), cobblestoning in 7 cases (28%) (Figures 5 and 6), graft rejection in 1 case (Figure 7), crowding of grafts in 2 cases (8%) (Figure 8), static graft with no pigment spread in 1 case (4%) (Figure 9), reactivation of vitiligo in two cases (8%) (Figures 10 and 11), and target-like pigmentation (halo around individual grafts) in two cases (Figures 11 and 12) were noted. In Figure 11, the case developed pigment dilution and depigmentation in recipient area and around the grafts at the end of 5 months of punch graft with appearance of depigmentary macules as spots throughout the body and with subsequent steroid therapy, depigmentation disappeared, and repigmentation started. In Figure 12, perigraft halo was noted around individual grafts at the end of 7 months. In 1 case, pigmentation of white hair (leukotrichia) in scalp (4%) (Figure 13 and Table 6) was noted. Sinking, polka dot appearance, and color mismatching were not seen in our study.

Overall cosmetic improvement in recipient site was noted. On an average, the cosmetic improvement was 83% in the patients in the age group of 21-30 years and 67% in the group of 10-20 years age and 17% in the age group of 31-40 years. The cosmetic improvement was observed to be 90% in a focal, non-glabrous forehead case of 19-years-old girl (Figure 14a and b), 100% in a male patient of 43 years with lip vitiligo, in mucosal type (Figure 15a and b), 85% in non-glabrous skin, over nose, segmental vitiligo in 25-year-old male (Figure 16a and b), 85% in a segmental right mandibular area in a 25-year-old woman (Figure 17a and b), and 56% in glabrous skin (Table 7). The overall cosmetic improvement achieved was 70% in this retrospective study using the punch graft procedure.

**DISCUSSION**

The changes that occur in donor or recipient sites as complications can be prevented if proper precautions are taken before, during, and after the grafting procedure. Proper selection of the patient is the most important factor for achieving a good cosmetic result with any grafting procedure in vitiligo. The recommendation to be followed is to select a patient with no history of progression of lesions, no new lesions, and no history of a Koebner’s phenomenon over at least 1 year before the procedure. In a recent study on the issue of vitiligo stability, a period of “18 months...
of stable disease” was shown to be most suitable one for undertaking any grafting procedure. Recurrence of vitiligo at the grafted or donor site or appearance of new lesions may occur in unstable cases or if the disease becomes reactive after a period of stability. Scarring at the donor site was observed more in patients in the younger age group compared to no scarring in the older age group probably due to the reduced activity of fibroblasts in the older age group. Hyperpigmentation in donor site was not reported in earlier studies. Depigmentation was due to reactivation
Rajaram, et al.: Donor and Recipient site changes in Punch skin graft in stable vitiligo

Table 7: Assessment of cosmetic improvement in relation to age, sex, type, and site of vitiligo

<table>
<thead>
<tr>
<th>Cosmetic improvement grading (%)</th>
<th>Age</th>
<th>Sex</th>
<th>Type of vitiligo</th>
<th>Site of vitiligo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10-20</td>
<td>21-30</td>
<td>31-40</td>
<td>&gt;41</td>
</tr>
<tr>
<td>Excellent (91-100)</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good (71-90)</td>
<td>83%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair (51-70)</td>
<td>67%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad&lt;50</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Over all cosmetic improvement = 70%. S: Segmental, F: Focal, M: Mucosal, AF: Acrofacial

Graft rejection was 22%, whereas the same is 10% in the study reported by Das et al. This can be avoided by mastering the technique and by providing proper dressing and aseptic environment to the movement prone areas. MPS in the recipient area correlates with the study conducted by Savant et al., Lahiri, and Rajagopal et al. Cosmetic disfigurement in the recipient areas such as depigmentary joining line or perigraft halo noted in our cases could be due to two factors. First, improper placement of donor grafts, that is, far from the margin of the patch so that the repigmentation does not extend till the margin. Second, reason could be grafting in cases of unstable/active vitiligo. In active vitiligo, the autoimmune process consisting of activated T-cells is maximum at the margin of the lesion. These activated CD3+, CD4+, and CD8+ T cells express the cutaneous lymphocyte-associated antigen (HECA-452+) typical of infiltrating T cells. Hence, the periphery of the vitiligenous patch fails to repigment. By placing the grafts, initially all along the periphery just about 1-2 mm inside the outer border of the recipient area, the perigraft halo can be prevented. Cobblestoning noted in the other studies as well may be avoided using smaller punches of 1-1.5 mm size, putting upper surface of the thinner graft at the level of recipient skin, trimming the under surface of the thicker graft, using sharp cutting edge instruments, and avoiding trauma to the graft and using silicon sheet dressing. Overcrowding of grafts may be minimized by placing grafts at least 5 mm apart from each other. Target-like pigmentation (halo around individual grafts) noted in Figure 11 was due to reactivation of vitiligo, and the second case could be due to contraction of elastin fibers during harvesting of grafts or scarring around individual grafts and both the factors had been well stated by Bisen et al. Savant mentions use of donor grafts 0.5 mm larger than the recipient bed to compensate for any graft contraction and prevent perigraft circular scarring. 2.5 mm punches which are 0.5 mm larger than the recipient site punches used by
Lahari et al. also noticed such target-like pigmentation in their studies. However, Rajagopal et al. reported the use of same size punches with good results.16,20 Pigmentation of leukotrichia noted in our study is an added advantage of punch graft procedure and was already reported by Savant.7 The cosmetic improvement achieved in our study was also recorded by many authors.7,10,13,16,18

CONCLUSION

Punch skin graft procedure is a simple, safe, inexpensive, and quickly responding office procedure with high success rate of pigmentation. If the selection of the stable vitiligo cases and the expertise of the operating surgeon are good, the donor and recipient site changes may be reduced to a greater extent to yield a better cosmetic result.

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.
Analysis of the Outcome of Total Knee Replacement in Obese and Overweight Patients with Varus and Valgus Deformities

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Abstract

Introduction: The study was done with the objective to evaluate clinical and functional outcomes of total knee replacement in obese patients in terms of relief of pain and range of movements.

Materials and Methods: The study was done during the period between 1998 and 2014. All the patients’ data were maintained and recorded. The data were obtained from the medical records department of both hospitals. Each patient was followed up for 6 months - 8 years.

Results: A total of 74 patients were included in the study with the mean of age of 62 years among obese and non-obese patients, the follow-up period of 6 months. The outcomes of the total knee replacement surgeries among obese patients were excellently well similar to other patients.

Conclusion: The study has concluded that the both clinical and functional outcomes were similar in both obese and non-obese patients who underwent total knee replacement.

Key words: Obese, Total knee replacement, Valgus deformity, Varus deformity

INTRODUCTION

Obese patients are commonly suffering from cardiac problems, joint problems, and diabetic related problems. Many patients are taking care for diabetic and cardiac health problems in early stage itself, but for joint problems, they are reporting at late stages with complications such as deformities. Similarly, increased deformities and the most common malalignment problems are encountered during total knee replacements. In obesity, the knee joint is subjected to major stress than any other joints. Hence, in obese patients, total knee replacements may pose many biomechanical problems. Total knee replacements are the only treatment for obese patients with arthritic knee with significant pain and deformity. Various procedures such as osteotomy, synovectomy, and patellectomy have narrow indications and limited prognosis in relieving pain. Obese patients are prone for infections, either or recurrent infections.

Aims and Objectives

The present study evaluates clinical and functional outcomes of total knee replacement in obese patients in terms of relief of pain and range of movements.

MATERIALS AND METHODS

The study was done during the period between 1998 and 2014. All the patients’ data were maintained and recorded. The data were obtained from the medical records department of both hospitals. Each patient was followed up for a period of 6 months - 8 years.

Inclusion and Exclusion Criteria

Gait analysis revealed that the deformities such as rotational or angular were selected for surgery. The amount deformity...
along with passive correction attained is measured. Unusual angulation of tibia and femur is noted, whether varus or valgus deformities are fixed, or flexible is assessed. Pseudolaxity due to loss of medial joint space must be differentiated from fixed varus knee contractures of the hip and knee, foot deformity, and vascular status of the limb was assessed.

**X-rays**

1. **AP weight bearing**
   
   Standing X-rays of the limb were taken to measure anatomical and mechanical axis. If the widening is not taken into consideration, malalignment may be overcorrected.

2. **Lateral view**

3. **Axial view:** To look for patellofemoral arthritis and patellar instability

4. **Varus/valgus stress view** to assess the correct ability and residual contractures and bone loss

5. **Long leg AP view:** To assess the tibiofemoral angle extra articular deformities and weight bearing axis.

**Operative Procedure**

Under general anesthesia or regional anesthesia, patient was placed on supine position. Under tourniquet control through anterior midline, incision knee was approached in all cases. For 62 patients, we used Freeman–Samuelson type of prosthesis. For 12 patients, Johnson and Johnson prosthesis was used. Cementation was used in all cases. As it was required for correction deformity in the entire cases, posterior cruciate was sacrificed. Varus deformity was managed by the following methods. Excision of medial aspect osteophytes and by release of sleeve of soft tissue consisting of periosteum, insertion of pes anserinus, deep and superficial layers of medial capsule. Valgus deformity was managed by relax of lateral capsule, lateral retinaculum, lateral femoral periosteum, distal iliotibial band, and popliteus tendon (Figure 1). Flexion deformity was corrected by removal posterior osteophytes, relax of capsule from posterior tibia and femur, and antibiotics was given 5-7 days.

**Post-operative Period**

In post-operative period, for obese patients, the limb was immobilized in a tube slab for 3-4 days. In some of the patients, it was prolonged for even 7-8 days as soft tissue release was done. Sutures were removed on the 12th day. Gradual to full weight bearing was started as tolerated by the patients.

**RESULTS**

A total of 74 patients were selected for the study, of which 64 were with osteoarthritis and 8 with rheumatoid arthritis, and the remaining 2 were HTO. Similarly, 68 cases were unilateral, and 3 were bilateral. The females were 58, and the remaining 16 were males. The mean age of females was 61.75, and the mean age of males was 67 years. Mean weight of females and males were 66.8 and 79.8, respectively. In OA varus deformity, 42 had severe deformity and 22 moderate deformities (Figure 2). Follow-up period ranges from 6 months to 8 years with the mean follow-up of 3 years, and the results were analyzed using the Knee Society Clinical Rating System.

**DISCUSSION**

In the normal knee, loads that are 2-4 times body weight are imposed on tibiofemoral joint, with 60% of the load passing through the medial compartment. In these obese patients, the medial compartment leads to loss of cartilage on the medial articular surface of the femur and tibia. The partial body weight has to act as a longer moment than the normal since the position of the knee places it for lateral from the center of gravity. The balancing force on the lateral side increased. The stress on the medial compartment is increased and that force is exerted through a smaller than normal surface. This increase in stress causes the degenerative process to accelerate further. The adductor movement and lateral ligament stretching given a lateral tibial thrust, and this leads to lateral rotatory subluxation of the tibia. With operations...
for knee arthroplasty increasing faster than those for total hip replacement, some of the British skepticism about knee surgery is clearly disappearing. Recent studies justify this change of attitude: In experienced units, the insertion of condylar prostheses in well-selected cases probably has a higher success rate than that for total hip replacement and gives rise to fewer long-term complications and failures.\textsuperscript{1,2} The operation’s success depends on the selection of patients, choice of prosthesis, and surgical skill. Patients should be judged on their symptoms rather than their radiological signs; the correlation between the two may be poor. Provided they are fit enough for surgery patients with pain at rest, and disturbed sleep should be offered operation. Those whose pain on movement confines them to their home and garden should also be considered. The operation relieves pain in more than 95\% of cases\textsuperscript{2,3} with functional improvement occurring in over 90\%.\textsuperscript{4} Patients with rheumatoid arthritis do particularly well.

CONCLUSION

This present study has concluded that obese and non-obese patients improved well as far as the clinical and functional outcome is concerned irrespective of difference and gender difference.

REFERENCES


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Clinical Profile and Predictors of Mortality of Myocarditis in Tertiary Care Hospital

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²Senior Resident, Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India,
³Postgraduate Scholar, Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

Abstract

Introduction: Clinical profile of myocarditis has not been well characterized in our local population.

Aims and Objectives: To study the clinical profile and predictors of mortality of myocarditis in a tertiary care hospital.

Materials and Methods: It was a prospective single-center observational study done from November 2010 to October 2012. All patients who were diagnosed and admitted as myocarditis were included in the study.

Results: A total of 30 patients were diagnosed as myocarditis. Mean age of the patients was 35 ± 13.1 years, with male to female ratio of 1.3:1. The most common presenting symptom was breathlessness and chest pain while as most common sign was tachycardia. Two-third of patients had congestive heart failure and one-half had left ventricular (LV) dysfunction. Inpatient hospital mortality was 16.6%. Advanced New York Heart Association (NYHA) Class IV (P = 0.0004), hypotension (P = 0.0026), and LV ejection fraction <35% (P = 0.0018) were found to be significantly higher in non-survivors as compared to survivors.

Conclusion: Patients presenting with advanced NYHA Class, hypotension and those having severe LV dysfunction are more likely to die; hence, need very careful and aggressive management.

Key words: Congestive heart failure, Mortality, Myocarditis

INTRODUCTION

Myocarditis refers to the inflammation of the heart muscle occurring as a result of exposure to external agents (viruses, bacteria, and toxins) or internal triggers such as autoimmune activation. Some studies have reported myocarditis as third leading cause of sudden death after hypertrophic cardiomyopathy and coronary artery disease.¹ The clinical manifestation of myocarditis, ranging from asymptomatic courses over presentations with signs of myocardial infarction with cardiogenic shock.²³ Clinical course in acute myocarditis can vary. It can be monophasic with spontaneous recovery after several days of congestive heart failure.⁴ While some patients develop cardiogenic shock and have fatal outcome.⁵ Serious complications include ventricular arrhythmias, cardiogenic shock, or cardiac arrest.⁶ Patients who suffer from myocarditis may recover or develop dilated cardiomyopathy with heart failure and the need for heart transplantation.⁷ Some patients may progress into subacute or chronic forms who have poor long-term prognosis.⁸ There are very few studies on the prognostic markers in myocarditis. Predictors of mortality in myocarditis have not been fully established. Besides there are hardly any studies on our local population. This study was carried out to meet this unmet need of identifying the clinical profile and predictors of mortality in patients admitted with acute myocarditis.

Aims and Objectives

To study the clinical profile and predictors of mortality in myocarditis patients.

MATERIALS AND METHODS

It was a prospective single-center observational study done from November 2010 to October 2012. All patients who
were diagnosed to have suspected myocarditis on the basis of clinical features, Troponin T, and echocardiographic features were included in the study.¹⁰ Each patient underwent a good clinical history, physical examination, hemogram, kidney function test, liver function test, and echocardiography.

RESULTS

A total of 30 patients were diagnosed as myocarditis. Mean age of the patients was 35 ± 13.1 years. Age distribution is shown in Table 1. Male to female ratio was 1.3:1. The baseline characteristics are shown in Table 2. The main symptoms included breathlessness (20/25, 66.6%), chest pain (21/30, 70%), fever (18/30, 60%), viral prodrome (20/30, 66.6%), cough (12/30, 40%), and lastly by vomiting (6/30, 20.00%). The main clinical signs included tachycardia (22/30, 73%), left ventricular (LV) third heard sound in 20/30 (66.6%). 19 patients (63.3%) were in congestive cardiac failure. Six patients (20%) had hypotension at presentation. 17 patients (56%) had LV systolic dysfunction. 12 patients (40%) had aspartate transaminase and alanine transaminase more than 3 URL. 26 patients (86.6%) had erythrocyte sedimentation rate (ESR) more than 20. 12 (40%) patients had leukocytosis with white blood cell count more than 12000. Inpatient hospital mortality was 16.6%. Advanced New York Heart Association (NYHA) Class IV (P = 0.0004), hypotension (P = 0.0026), and LV ejection fraction (EF) <35% were found to be significantly higher in non-survivors as compared to survivor as shown in Table 3.

DISCUSSION

Our study was intended to study the clinical profile and predictors of mortality in patients admitted as myocarditis. We tried to elucidate the factors which can lead to worse outcome in these patients. The age of presentation in our study varied between 13 and 70 years which was comparable with the study conducted by Helin et al.¹¹ in which the age varied between 9 and 65 years. Male to female sex ratio in our study was 1.35 comparable with study conducted in Thailand by Dechkum et al. in 1987-1989 (M: F=1.24).¹² The main symptoms included breathlessness (20/25, 66.6%), chest pain (21/30, 70%), fever (18/30, 60%), viral prodrome (20/30, 66.6%), cough (12/30, 40%), and lastly by vomiting (6/30, 20.00%) which is comparable with other studies.¹³ We noted that among the clinical markers, hypotension, and NYHA FC IV were strong predictors of mortality in myocarditis. This implies that patients who die are already in the condition of cardiogenic shock and congestive heart failure. Aggressive treatment should be initiated when patients show symptoms of hypotension and congestive heart failure. Advanced heart failure symptoms (NYHA Classes III or IV) and hypotension have also been reported to be associate with higher mortality.¹⁴ ¹⁵ We also noted that EF <35% is significantly associated with increased mortality (P = 0.0018). This has been shown by Schultz et al. and Magnani et al. who showed that prognosis for patients with acute myocarditis depends on EF.¹⁶ ¹⁷ Neutrophilic leukocytosis, and raised ESR was present in 40% and 86.6% respectively; however, increased ESR and neutrophilic leukocytosis were not associated with increased mortality, which is consistent with other studies.¹¹ Liver enzymes were elevated more than three times in 40% of

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Survivors 25 (83.33%)</th>
<th>Non survivors 5 (16.66%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean (SD)</td>
<td>36±12</td>
<td>35±13</td>
<td>0.8</td>
</tr>
<tr>
<td>Males</td>
<td>13</td>
<td>12</td>
<td>1.0</td>
</tr>
<tr>
<td>NYHA Class 4</td>
<td>3 (12%)</td>
<td>5 (100%)</td>
<td>0.0004</td>
</tr>
<tr>
<td>Chest pain</td>
<td>18 (72%)</td>
<td>3 (60%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Fever</td>
<td>15 (60%)</td>
<td>3 (60%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Hypotension</td>
<td>2 (8%)</td>
<td>4 (80%)</td>
<td>0.0026</td>
</tr>
<tr>
<td>Signs of CHF</td>
<td>15 (60%)</td>
<td>4 (80%)</td>
<td>0.6</td>
</tr>
<tr>
<td>EF&lt;35%</td>
<td>5 (20%)</td>
<td>5 (100%)</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

SD: Standard deviation, EF: Ejection fraction, CHF: Congestive heart failure, NYHA: New York Heart Association

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Table 1: Age distribution

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Number (%)</th>
</tr>
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<tbody>
<tr>
<td>10-30</td>
<td>11 (36.6)</td>
</tr>
<tr>
<td>31-50</td>
<td>16 (53.3)</td>
</tr>
<tr>
<td>50-70</td>
<td>3 (10)</td>
</tr>
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Table 2: Baseline characteristics

<table>
<thead>
<tr>
<th>Baseline parameters</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) mean±SD</td>
<td>35±13.1</td>
</tr>
<tr>
<td>Male:female</td>
<td>1.3:1</td>
</tr>
<tr>
<td>NYHA functional class</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>2 (6)</td>
</tr>
<tr>
<td>II</td>
<td>6 (20)</td>
</tr>
<tr>
<td>III</td>
<td>14 (46.6)</td>
</tr>
<tr>
<td>IV</td>
<td>8 (26.6)</td>
</tr>
<tr>
<td>Ejection fraction (%)</td>
<td></td>
</tr>
<tr>
<td>EF: &gt;45</td>
<td>13 (43.3)</td>
</tr>
<tr>
<td>EF: 35-45</td>
<td>7 (23.3)</td>
</tr>
<tr>
<td>EF: &lt;35</td>
<td>10 (33.3)</td>
</tr>
<tr>
<td>Clinical features</td>
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</tr>
<tr>
<td>Chest pain</td>
<td>21 (70)</td>
</tr>
<tr>
<td>Viral prodrome</td>
<td>20 (66.6)</td>
</tr>
<tr>
<td>Fever</td>
<td>18 (60)</td>
</tr>
<tr>
<td>Cough</td>
<td>12 (40)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>6 (20)</td>
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<tr>
<td>Hypotension</td>
<td>6 (20)</td>
</tr>
<tr>
<td>CHF</td>
<td>19 (63.3)</td>
</tr>
<tr>
<td>Died</td>
<td>5 (16.6)</td>
</tr>
</tbody>
</table>

SD: Standard deviation, EF: Ejection fraction, CHF: Congestive heart failure

Table 3: Comparison of survivors versus non-survivors

---

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Survivors 25 (83.33%)</th>
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<td>18 (72%)</td>
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</tr>
<tr>
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<td>15 (60%)</td>
<td>3 (60%)</td>
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<td>2 (8%)</td>
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<td>EF&lt;35%</td>
<td>5 (20%)</td>
<td>5 (100%)</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

SD: Standard deviation, EF: Ejection fraction, CHF: Congestive heart failure, NYHA: New York Heart Association
patients. The elevation of liver enzymes has been quite variable in previous studies by Smith (14%)\textsuperscript{18} and by Koontz and Ray (15%).\textsuperscript{19} Sainani \textit{et al.} (63%),\textsuperscript{13} and Hashimoto \textit{et al.} (100%).\textsuperscript{20} The variation in elevation of liver enzymes depends upon the time at which the samples were taken and also upon the severity of the illness of the patients as explained by Hashimoto \textit{et al.}\textsuperscript{20} Our findings suggest that those patients who present with advanced NYHA Class, hypotension and have severe LV dysfunction should be aggressively and promptly treated and observed in intensive care settings. Limitations of our study included small sample size, endomyocardial biopsy, and cardiac magnetic resonance imaging were not done in patients. Besides patients who survived were not followed up to assess their long-term outcome.

**CONCLUSION**

Patients presenting with advanced NYHA Class, hypotension and those having severe LV dysfunction are more likely to die and hence need very careful and aggressive management. Long-term follow-up studies with larger sample size are required to fully establish the predictors of poor outcome of myocarditis patients.

**REFERENCES**


**Source of Support:** Nil, **Conflict of Interest:** None declared.
Factors Deciding the Primary Management in Oral Cancer

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³Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal’s Healthcare Limited, Tirunelveli, Tamil Nadu, India

Abstract

Introduction: Oral malignancy commonly caused by oral usage of tobacco products is a challenging one for proper treatment.

Aim: The aim of the study is to study the factors that play an important role in deciding the primary modality of management in oral cancer.

Materials and Methods: A prospective study on the oral cancer conducted in the Department of General Surgery and Surgical Oncology, etc.

Results: In this study, 162 patients were included, 100 were male and 62 were female. In this study, the most patients presented in Stage IV, 48.76% (79 cases). Stage III patients were second most common 32.10% (52 cases).

Conclusions: Among the factors deciding the primary modality of treatment in oral cancer, stage of the disease at diagnosis is the first and foremost, though other factors such as age of the patient, socioeconomic status of the patient, and histological type of the disease are also important in deciding the primary modality of treatment.

Key words: Head and neck malignancy, Management

INTRODUCTION

Cancer of the oral cavity ranks among the ten most common cancers in the world with marked geographical variation.¹ 2-6% of all cancers diagnosed in the US are oral cavity cancers which by themselves accounts for more than 30% of all head and neck cancers. In the US alone more than 30,950 new cases of oral cavity cancer and 4000-8000 deaths are reported each year.²

Worldwide, there is great variation in the incidence of oral cancer. In Western Europe and Australia, the incidence closely resembles that of the US. The highest rates of oral cavity cancers are to be found in France, India, Brazil, central, and Eastern Europe.³ Regional variation in the incidence of oral cancers is predominantly due to differing social customs. Cancer of the oral cavity ranks among the ten most common cancers in the world with marked geographical variation. Worldwide, there is great variation in the incidence of oral cancer.⁴

Aim

The aim of this study is to identify the factors which play an important role in deciding the primary management and ascertain the same.

MATERIALS AND METHODS

This prospective study was conducted at Department of General Surgery in association with Department of Surgical Oncology, Department of Medical Oncology and Department of Radiation Oncology, Government Rajaji Hospital, Madurai. Patients admitted to oral cancers were included in this study. Approval of the ethical committee of the institution was obtained and informed written consent was obtained from every patient with oral cancer. History
recorded from every patient including present history, past history, and personal history. A thorough examination of the patient particularly the oral cavity was done and recorded properly. Investigations such as biopsy to confirm the diagnosis, computerized tomography scan, and magnetic resonance imaging scan done to stage the disease apart from investigations to assess the general condition of the patient. The results were tabulated, assessed, and a conclusion obtained.

RESULTS

In this study, 162 patients were included, 100 were male and 62 were female. Most patients presented in Stage IV, 48.76% (79 cases). Stage III patients were the second most common 32.10% (52 cases). Thus, most patients presented late as Stage III and Stage IV. Stage I and II patients were comparatively less (Table 1).

The maximum number of cases 19.75% (32 cases) in males was in the 51-60 age groups. In females, the maximum numbers of cases were seen in the 61-70 age groups 12.35% (20 cases). Overall, in both males and females, the maximum number of cases was noted in the 6th and 7th decade 31.48 (51 cases) and 30.25 (49 cases), respectively (Table 2).

Males constituted 61.73% (100 cases) of the cases where as females made up the remaining 38.27% (62 cases). The sex ratio obtained in the study was 1.61:1 with a range varying from 1:3 to 6.5:1. Except for the third decade, all other decades showed a male predominance (Table 3).

31 cases with Stage I and II disease and 33 cases with Stage III and IV had surgery (Table 4).

Of the total 64 patients who had surgery, 43 patients were offered surgery as the primary treatment. 12 patients had surgery following chemoradiation. 3 patients with adenoid cystic carcinoma and 6 patients with verrucous carcinoma had surgery. Most of the patients with oral cavity cancers who reported at late stages opted for non-operative treatment. Overall, 39.51% of patients with oral cavity cancers underwent surgery (Table 5).

Patients who were operated for verrucous carcinoma does not have other treatment option except surgery, and this histological type of Oral cancer may not be amenable for Radiotherapy as well as chemotherapy, thus it signifies that histology of the disease is one another factor which decides the primary modality of treatment. No recurrences were reported among those 6 patients.

DISCUSSION

The management of oral malignancies is multifactorial. Nevertheless, surgery has remained the cornerstone of managing these patients and the surgeon’s role in the multimodality approach is of paramount importance. Although many factors decide the primary management of
oral cancer, the first and foremost is the stage of the disease. In the present study, 48.76% patients \((n = 79)\) presented in Stage IV at the time of diagnosis. Stage III patients were the second most common \((32.10\% \ n = 52)\). Thus, the most patients presented late as Stage III and Stage IV. Stage I and II patients were comparatively less (Table 1).

Among the 79 patients, in Stage IV only 19 (24%) were operable/underwent surgery. Similarly, among the 52 patients in Stage III only 14 (26%) underwent surgery whereas all the patients who presented in Stage I and II were operable. This indicates that stage of the cancer at the time of diagnosis is a crucial factor in deciding primary treatment. Similar observations have been made by Güneri et al., stage of the disease was found to significantly affect outcome and prognosis. In addition, O’Brien et al. have analyzed the rate of occult metastasis in node negative oral malignancies. They have concluded that selective neck dissection based on the size of the tumour, in node negative cases can help in early detection of these occult metastases.

The age of the patient is another factor which determines the primary treatment. Around 31.5% were diagnosed in the 6th decade and 30% in 7th decade and most of them (99%) belonged to low income group. Li-Ting et al. have noted that adjusting for sex, age at diagnosis, and the site of cancer is the best indicator of severity when staging information is not available.

Socioeconomic status is another factor which determine the primary management. Since literally all the patients except one comes under low socioeconomic group, they form the major group both age-wise and stage-wise, their illiteracy and ignorance might be the reason for them to arrive with advanced diseases, which is the primary factor in determining the primary management of oral cancer. Gellrich et al. have studied the effect of nutritional status in oral malignancies and have seen that poor nutritional status significantly affects the quality of life. Professional nutritional counseling and psychosocial support can make a big difference in them.

The histology is one another factor in deciding the primary management. Although squamous cell carcinoma responds equally good with both surgery and radiotherapy, the choice between the treatments is made based on the site, stage of the disease, availability of radiotherapy, and expertise in surgery. In case of verrucous carcinoma and malignant melanoma, surgery is the obvious treatment. According to Kalavrezos et al., the histological factors that determine the surgical management in oral malignancies are grade of the tumour, depth of the lesion, and pattern of invasion.

**CONCLUSION**

Among the factors deciding the primary modality of treatment in oral cancer stage of the disease at diagnosis is the first and foremost, though other factors such as age of the patient, socioeconomic status of the patient, and histological type of the disease are also important in deciding the primary modality of treatment.

**REFERENCES**

Usefulness of Pre-operative High-resolution Computed Tomography in Middle Ear Cholesteatoma

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Abstract

Introduction: Cholesteatoma is traditionally diagnosed by otoscopic examination and treated by exploratory surgery. The need for imaging in an uncomplicated case is contentious. The study assesses the usefulness of a pre-operative high-resolution computed tomography (HRCT) in depicting the status of middle ear structures in the presence of cholesteatoma.

Aim: The aim of this study is to evaluate the efficacy of pre-operative HRCT in the assessment of disease in patients with middle ear cholesteatoma. Pre-operative high-resolution temporal bone CT scans were carried out and compared with intraoperative findings.

Materials and Methods: In this prospective observational study, 30 patients with cholesteatoma were included in the study.

Results: HRCT shows the presence of non-dependent tissue mass in 28 of 30 cases. Evidence of destruction of bony walls of the middle ear, mastoid antrum, or ossicles was sought after, and 25 cases showed all the 3 features.

Conclusion: The patient is benefited as he has presurgical assessment rather wait for results of surgical exploration. Forewarned about complications, the patient has a pictorial depiction of the disease and understands the need for surgical intervention and difficulty in hearing preservation.

Key words: Auditory canal, Cholesteatoma, Ossicles, Tympanic

INTRODUCTION

Cholesteatoma is traditionally diagnosed by otoscopic examination and treated by exploratory surgery. The need for imaging in an uncomplicated case is contentious. The study assesses the usefulness of a pre-operative high-resolution computed tomography (HRCT) in depicting the status of middle ear structures in the presence of cholesteatoma.¹ Cholesteatoma is a sac of keratinizing squamous epithelium in the middle ear cleft. The lesion is classically recognized by the presence of attic squames on otoscopic examination. The presence of cholesteatoma must also be suspected beneath polyps protruding from the pars flaccid or when there is a marginal tympanic membrane perforation or granulation. Cholesteatoma is a potentially serious condition as it can progressively enlarge and erode into neighboring structures giving rise to serious intracranial and extracranial complications.²³ Barring any medical contraindications, treatment of suspected cholesteatoma is by surgical exploration and eradication of disease with tympanomastoidectomy operation. Unlike the situation with endoscopic sinus surgery whereby routine pre-operative CT scan is widely accepted as standard practice, the need for pre-operative imaging studies for cholesteatoma is controversial. Even among experienced otologist, there is no single accepted standard for the need of CT scan in uncomplicated cases.⁴ The advent of HRCT has brought about significant enhancement in the pre-operative assessment of temporal bone pathology and fine anatomical details. The intent of this study is to evaluate the accuracy of this imaging modality in our patients undergoing surgery for cholesteatoma.⁵ HRCT provides

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excellent details of bony landmarks within temporal bone, due to inherent contrast, its dense bone being surrounded by air of the tympanic cavity and the mastoid air cells. It has also added a whole new dimension to the evaluation of the temporal bone by allowing visualization of the soft tissue components within and adjacent to the temporal bone. Therefore, one of its major contributions to the otologist dealing with the disease is the pre-operative localization of the cholesteatoma sac, a detail that not only determines the type of surgical approach but also alerts the surgeon to the possible intra- and post-operative complications.

**Aim**

The aim of this study is to evaluate the efficacy of pre-operative HRCT in the assessment of disease in patients with middle ear cholesteatoma and to provide a road map for surgery in these patients.

**MATERIALS AND METHODS**

This prospective observational study was conducted in the Department of ENT at tertiary care hospital.

**Inclusion Criteria**

Cholesteatoma detected by otoscopy, marginal tympanic membrane perforation, posterosuperior retraction and granulomas, history of scanty purulent blood, and foul-smelling discharge, modified radical mastoidectomy was planned, and surgical finding correlated were included in this study.

**Exclusion Criteria**

Patients with known intracranial/intratemporal complications and patients undergone previous mastoid surgery were excluded from the study. All the patient examinations were performed with Toshiba asterion spiral CT scan. Patients were scanned in two plane, axial 30° with the patient placed supine with head flexed and scan plane passing through the external auditory canal and superior orbital rim. Coronal sections were performed with the patient placed prone with the neck maximally extended, and the scan plane was oriented to intersect the external auditory canal to the posterior margin of the maxillary sinus presurgical HRCT scan was retrospectively assessed by the radiologist. In addition, being blinded to the surgical findings, the radiologists were asked to comment on the status of ossicles, integrity of the facial canal, semicircular canals and the tegmen tympani, and any anatomical variations and disease complications.

**RESULTS**

In our study, 30 patients were included, 14 were male and 16 were female. Ear discharge is the most common symptoms observed.

HRCT shows the presence of non-dependent tissue mass in 28 of 30 cases. The location of the pathology on the scan was typical for cholesteatoma in 28 cases, and in 27 cases, there was radiological evidence of destruction of bony walls of the middle ear, mastoid antrum, or ossicles. All the cases had at least one radiological feature, and 25 cases showed all the 3 features. The correlation was found to be excellent for malleus, stapes, and semiauricular canal, good for the incus and tegmen tympani but poor for the facial nerve canal (Figure 1).

**Status of the Ossicles**

Incus was the most frequently eroded, followed by malleus and stapes. Out of the 27 incus found eroded in the surgery, 24 were found eroded in the scan. Out of 15 eroded malleus, 13 were picked by the scan. 13 out of 15 of absent stapes suprastructure were correctly predicted by imaging (Table 1).

**Semicircular Canal Fistula**

3 out of 4 labyrinthine fistulae were picked by scan. One case had thinning of otic capsule. In remaining 26 cases, CT was incorrect in one case (Table 1).

**Erosion of the Tegmen Tympani**

3 patients had erosion of tegmen exposing dura, and this was shown in the scan. Of the remaining 27 cases, the scan missed one case as having tegmen dehiscence (Table 1).

**Facial Canal Dehiscence**

Of the 7 surgically confirmed facial canal dehiscences, only 3 could be detected by the radiologist. In 23 cases, the canal was found to be intact during surgery, but the scan suggested possible erosion in 2 of these cases. Various other anatomical variations and surgical hazards were detected as follows (Table 1).

- Erosion of posterior canal wall
- Erosion of sinus plate
- High and dehiscent jugular bulb
- Anteriorly lying sigmoid sinus
- Low lying Dura.
Table 1: Cross tabulation of radiological findings and surgical findings

<table>
<thead>
<tr>
<th>Surgical finding</th>
<th>Radiological findings</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intact</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Malleus</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Eroded Incus</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Intact</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Eroded Incus</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Stapes</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Absent</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Facial canal</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Dehiscent Incus</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Intact</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Fistula</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Tegmen</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Intact</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

DISCUSSION

Cholesteatoma can be accurately diagnosed in vast majority of cases. Mafee et al. reported correct diagnosis of cholesteatoma in 46 out of 48 patients. All our cases exhibited at least one of three features that are tissue mass, typical location, and bone erosion. 25 cases had all three features. When we base our diagnosis of cholesteatoma on the scan having at least two of the three features, all cases would be correctly diagnosed with cholesteatoma. Scan evidence of cholesteatoma with significant bony destruction or other complications would prompt the surgeon to operate earlier particularly if polyps or a tortuous bony canal obscures visualization of the traditional medicine and hinders clinical diagnosis. On the other hand, threshold to explore the ear may be higher if the scan is non-confirmatory, particularly if the patient has medical risks for surgery. The HRCT scan gives a good-to-excellent radio surgical correlation for the middle ear ossicles in our cases, and this is also the experience that the others have reported. While prior knowledge of the status of the ossicles is probably not critical in so far as the operative risk is concerned, it has bearing on the likelihood of hearing preservation that can be achieved after surgery. For example, the hearing outcomes in patients with an intact stapes tend to be better than those in where the stapes suprastructure is absent. Presurgical knowledge of the status of the ossicular chain would allow the surgeon to better advise the patient on the degree of hearing attainable after surgery.

Labyrinthine fistula can be accurately detected most of the time when both axial and coronal images are taken to look for erosion of the semicircular canal. The most common canal affected is lateral semicircular canal (LSC) and reliance on coronal sections alone may lead to 50% false-positive rate of dehiscence due to the artifact of partial volume averaging. Even with the addition of axial scans, minute fistula may be missed as seen in one of the patients. The scan, in this case, showed thinning of the bone over the LSC but no obvious fistulization. Careful dissection of cholesteatoma matrix over the dome of the LSC revealed a tiny bony canal fistula. The surgeon is well advised to treat every case as a potential fistula until proven otherwise. Tegmen erosion is well seen on coronal imaging, but again misinterpretations may result from volume averaging. Such is the case in one patient, where the scan suggested the tegmen to be breached but surgically proven to be intact. The reverse is also possible, whereby the dehiscent area may appear intact radiologically. Facial canal dehiscence is fairly common findings in 55% temporal bones and usually occurring in a focal area in the tympanic portion of the fallopian canal. Problem with partial volume averaging artifact is again evident as fallopian canal can be so thin even in a non-pathological ear as to appear dehiscent on CT scan. This explains poor radiological correlations with the surgical findings. In addition, we also found visualizing the tympanic portion of the facial canal to be, especially, difficult when there is an adjacent pathological soft tissue mass in the mesotympanum. Knowledge of facial nerve anatomy, careful dissection technique in the vicinity of the nerve, and the use of intraoperative facial nerve monitoring all help toward reducing the likelihood of facial nerve injury.

Besides giving information on the status of the middle ear structure, the CT scan can also delineate the extent and location of the disease. Cholesteatoma has a tendency to reside in hidden areas such as sinus tympani and anterior epitympanum. Knowledge of disease extent and information of degree of mastoid pneumatization aid in planning the surgical approach, whether to keep the canal wall up or down. However, CT can overestimate the disease as it cannot distinguish definitively between cholesteatoma and granulation tissue. An enhanced magnetic resonance imaging scan can discern the two better and maybe used if clinically indicated. Complications of cholesteatoma are associated with a high morbidity and can even be life threatening. However, the surgical treatment itself is also fraught with risks to many important structures because of the complex anatomy of the temporal bone. While we cannot quantify how the pre-operative scan decrease the rate of surgical complications, it is undoubtedly helpful in teaching our surgeons in training and enhancing their spatial orientation of the middle ear cavity.

A thorough understanding of the surgical anatomy and the knowledge of normal variation are crucial when
performing operations for chronically infected ears. Moreover, the pre-operative HRCT is useful in this regard. The scan aids even the experienced otologist by alerting him to the presence of anatomical variations such as the high-riding jugular bulb or a prominent sigmoid sinus and potential surgical hazards that may arise from the destructive nature of the disease such as the labyrinthine dehiscence. Pre-operative demonstration of facial nerve involvement was often difficult not only because of its small size but also due to its oblique orientation and the presence of developmental dehiscence particularly when abutted by the soft tissues. Radio surgical agreement is excellent for malleus, good for incus and stapes, labyrinth, and tegmen while poor for facial canal in our study. Hence, HRCT should be a routine examination before cholesteatoma surgery.

CONCLUSION

The patient is benefited as he has presurgical assessment rather wait for results of surgical exploration. Forewarned about complications, the patient has a pictorial depiction of the disease and understands the need for surgical intervention and difficulty in hearing preservation. The surgeon is armed with a visual aid to pre-operative counseling, spatial orientation of disease extent, and identifies problem areas before surgery. Pre-operative HRCT is indispensable in patients with middle ear cholesteatoma.

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INTRODUCTION

Man is inquisitive and curious by nature and has always wanted to explore the unknown. Human body itself has been a mystery earlier, and use of human cadavers as a study material has been opted for more than 5 years.¹

Study of the human body by dissecting a cadaver layer by layer from skin through subcutaneous tissue, muscles, organs, brain remains the pillar and an integral part of learning and teaching by a medical student and teachers.²

Although in present time importance of dissection and anatomy as such is decreased³⁴ as indicated by cutting short in tenure of studying the subject from 18 months to 12 months.⁵

Some are of the opinion that dissection is expensive and time-consuming and potentially harmful.⁶ Nowadays some institutions have stopped dissection of cadavers and started use of virtual decision table for the study of human anatomy.⁷

Still, it is believed that the dissection reinforces and elaborates the knowledge acquired by studying in theory classes.⁸

Since the first MBBS student sees the cadaver for the first time whom he/she will be dissecting using a scalpel blade in his life, it is important to know the first reaction of the young pupil who might not have seen a dead body so closely.

This encounter of the first kind may evoke many emotional reactions which may lead to positive or negative response.⁹

This encounter can have an effect on various senses which are stimulated when a cadaver is viewed and touched for the first time.¹⁰

Various psychological responses can be in the form of anxiety, stress, fear, depression, or excitement.

Physical factors are also stimulated such as foul smell, nausea, vomiting, lacrimation, and headache.
The impact on their life and ability to cope with it can be studied.

We undertook this study for recording the reaction and views of first-year MBBS students about the dissection of a cadaver for the first time.

**MATERIALS AND METHODS**

The present survey study was conducted in academic session of 2016-2017. 100 first-year MBBS students from the Department of Anatomy J.L.N Medical College and Hospital, Ajmer. Students were selected randomly they were informed about the type of questions and purpose of the study, after seeking their informed consent questionnaire containing 26 questions with multiple choices was provided to them and they were asked to choose an option, repeaters and remanded students were excluded from the study as they had previous exposure to the dissection hall and cadavers.

**RESULT**

Results are summarised in Table1, seventy six percent of students were excited on the first day in dissecting hall but 65% found it smelly and all were of opinion that it was not at all organised. Most of the students were surprised and excited after seeing a cadaver for first time and wished to be acquainted with it as quickly as possible. Sight of female cadaver instilled shock in 23% but 65% never felt fear or stress.

Only 25% students came prepared for dissection and 46% were not at all prepared while 56% preferred to dissect in groups and 64% needed help of others and 78% helped other students.

44% students read the dissector for 15 min daily and 50% spent 40-60 min on dissection.

Majority (80%) thought dissection is a must to understand gross anatomy and 64% said it is ethical to dissect a cadaver.

<table>
<thead>
<tr>
<th>Table 1: Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How was your first day in the dissection Hall? Pleasant 4% Exciting 76% Depressing 9% Horrifying 11%</td>
</tr>
<tr>
<td>2. How was the dissection hall, when you entered into it for the first time? Clean 20% Dirty 13% Smelly 67% Highly organized 0%</td>
</tr>
<tr>
<td>3. What kind of feeling did you have on the first day? Pleasant 4% Horrified 11%</td>
</tr>
<tr>
<td>4. How you felt after seeing the cadaver for the first time? Horrified 11% Surprised 55% Excited 32% Vague 2%</td>
</tr>
<tr>
<td>5. What was your reaction after seeing the cadaver for the first time? Fainted 4% Did not want to enter again 23% Wanted to become acquainted immediately 50% Feel satisfied 23%</td>
</tr>
<tr>
<td>6. What was your reaction after watching female cadaver? Fear 4% Curious 64% Shock 23% Horrified 9%</td>
</tr>
<tr>
<td>7. After how many days you were well acquainted with the cadaver for dissection? 1 week 64% 1 month 23% 3 months 4% Still find myself uncomfortable 9%</td>
</tr>
<tr>
<td>8. Have you ever had a fear/stress of entering in the dissection hall? Yes 13% No 65% Cannot say 6% Sometimes 16%</td>
</tr>
<tr>
<td>9. Do you come prepared for dissection? Yes 25% No 23% Sometimes 46% Always 6%</td>
</tr>
<tr>
<td>10. Do you dissect? Alone 6% Groups 56% Always alone 2% Always in groups 36%</td>
</tr>
<tr>
<td>11. Do you dissect alone or in groups? Alone 57% Group 10% Always alone 27% Always in group 8%</td>
</tr>
<tr>
<td>12. Do you dissect with somebody’s help? Yes 64% No 16% Sometimes 18% Always 2%</td>
</tr>
<tr>
<td>13. Do you help other students? Yes 78% No 2% Sometimes 16% Never 4%</td>
</tr>
<tr>
<td>14. How do you get dissection instruments? Get from the department 2% Has own instruments 89% Borrow from others 0% Do not have own 9%</td>
</tr>
<tr>
<td>15. Could you feel the smell of formalin when you entered the hall for the first time? Yes 75% No 6% Can’t say 0% Gets irritated 19%</td>
</tr>
<tr>
<td>16. How much time was spent by you to do the dissection (Total 120 min period)? &lt;20 min 6% 40-60 min 50% 20-40 min 36% &gt;60 min 8%</td>
</tr>
<tr>
<td>17. How much time was spent by you in reading dissector to understand dissection and gross anatomy? 1 h daily 13% 15 min daily 44% 30 min daily 36% Not at all 7%</td>
</tr>
<tr>
<td>18. Do you think dissection is must understand gross anatomy? Yes 80% No 9% Can’t say 2% To some extent 9%</td>
</tr>
<tr>
<td>19. Do you think cadaver dissection is ethically acceptable? Yes 64% No 6% Can’t say 18% To some extent 12%</td>
</tr>
<tr>
<td>20. Do you think dissection should be continued in the syllabus? Continued 78% Stopped 2% Can’t say 10% Reduced 10%</td>
</tr>
<tr>
<td>21. Instead of dissection can any other method be applied to learn gross anatomy? Yes 41% No 25% Can’t say 32% None 2%</td>
</tr>
<tr>
<td>22. Do you think dissection helps in learning future of medical subjects? Strongly agree 36% Disagree 4% Agree 51% Neither agrees nor disagree 9%</td>
</tr>
</tbody>
</table>

(Contd..)
and 78% wanted dissection to be continued in medical colleges. Around 85% wanted actual hands on training on cadavers with help of staff.

DISCUSSION

A student who clears the entrance exam for medical college and plans to study various subjects encounter with anatomy is one of a special kind where they have not only read books but have an experience with the human body who they also have to dissect.

What goes on in their minds after entering the dissection hall and thought of the dissecting over a dead human body is the matter of study.

We found that 76% of the students were excited on the first day of entering the dissection hall which is in concordance with a study undertaken by Horne et al.\textsuperscript{11}

Most (65%) were not harboring any fear of the dead body while 16% students felt haunted and 10% felt fearful on holding the bones for the first time.

About 85% of students were of opinion that actual hands-on training on cadaver gives better results than demonstration on a prospected specimen and 70% wanted dissection to be continued in anatomy classes.

About 64% responded that it is ethical to have a cadaver for study.

Older\textsuperscript{12} also found dissection as an essential requirement to study human anatomy.

McLachlan et al.\textsuperscript{8} said that dissecting a cadaver is an important step in learning and being a doctor.

A study by Jones\textsuperscript{2} Rajkumari and Singh,\textsuperscript{13} Rajkumari et al.\textsuperscript{14} were also of opinion that actual hands-on training is an important part of the medical curriculum.

41% of the responded agreed that alternate methods can be adopted to learn, but 32% were not sure of alternate methods used for the study of anatomy.

64% of the students wished to be helped by teaching staff while dissecting, as also was shown by Rajkumari et al.\textsuperscript{14} and it is done in our institution, staff, and all the in-charge of different dissecting tables help students while performing the dissection.

Unfortunately, only 25% of the students came prepared for dissection beforehand, and 44% said that they dissect with the help of the dissector which they read for 15 min daily after entering the dissection hall.

On entering the 75% found it to be smelling of formalin 19% were irritated by the smell but none found it to be organized.

Sight of the cadaver surprised 55% of the students while 11% were fearful while 50% of the students wanted to be acquainted with the cadaver immediately.

Female cadaver ignited curiosity in 64% while 9% of students were fearful by sight of a female cadaver.

It took a whole week to majority of students to be acquainted with the dissection.

About 60% of the students did not feel any stress, but 11% were alarmingly depressed, interestingly 25% of the students enjoyed the first day of the dissection.

Many studies have studied the emotional reactions of the students in dissection hall suggesting that some students suffer from anxiety and stress as by Horne et al.\textsuperscript{11} while other studies reported that there is no adverse reaction to the exposure of cadaver\textsuperscript{15} as was seen in our study.

In contrast to the study by Nnodim et al.\textsuperscript{16} who reported 75% of the students being upset with exposure to dissection while we found that 64% of students were curious, 65% did
not have any fear of entering the decision hall, and 78% wished to help other students while dissecting.

CONCLUSION

We can conclude that most of the two students though found a dissection hall smelly and disorganized but were excited, curious, and relaxed while visiting it.

They were of opinion that dissection of cadaver was integral and inseparable part of study curriculum.

The students also wished to be guided by a teacher in the dissection hall.

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Magnetic Resonance Imaging Evaluation of Brain in Developmental Delay Children

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Abstract

Introduction: Developmental delay is termed as gross or significant delay in more than one developmental domains. Aetiology of the developmental delay is the wide spectrum. MRI is the best modality to evaluate such children. Other than early diagnosis and treatment, helps in counselling parents regarding their outcome and risk of recurrence in the siblings.

Materials and Methods: An observational and descriptive study of MRI brain in 100 paediatric patients with developmental delay for the duration of 2 years from December 2014-December 2016.

Results: Normal MRI Findings were seen in 36% cases and abnormal findings were seen in 64% (64 cases). Further the etiological factors as been classified as traumatic/neurovascular (30%), congenital/developmental (12%), metabolic/ degenerative (8%), neoplastic (4%) and non-specific (10%). Most common features observed in the study were PVL, gliosis with volume loss, thinning of corpus calosum. Common anatomical abnormalities are corpus callosum agenesis and nodular heterotopia.

Conclusion: MRI brain study is an effective tool in identifying causative factor in developmental delay children with high yielding results.

Key words: Magnetic resonance imaging, Developmental delay, Brain

INTRODUCTION

Developmental in its broadest sense encompasses physical and mental growth that leads to the anatomical, physiological and behavioural changes that occur throughout childhood. For most paediatricians, child development relates to the changes in children’s ability to move, perform fine movements with their hands, communicate, learn new knowledge, self-care and interact with others.

Development is a dynamic process that is determined by interaction of genetic, biological and environmental factors.¹ Developmental delay is defined as significant delay (more than 2 standard deviations below the mean) in one or more developmental domains.² Cognitive and motor development observed in infants and children are a reflection of postnatal brain development. Myelination and synaptogenesis are considered the biological correlates of this developmental process and have been studied extensively. Any delay in neurodevelopment is likely to have a biological correlate. Brain MRI is one of the major investigation of these patients and based on previous studies, about 60% of cases have abnormal findings in MRI.³

Prevalence of developmental delay in children has been reported 5-10%.⁴ MR imaging is an important part of the comprehensive evaluation of children with developmental delay, as many specific etiologic and pathophysiologic conditions that lead to developmental delay can be detected easily.⁵,⁶ Aim of the study is to know the most common MRI brain findings in children with global developmental delay and prevalence of normal and abnormal findings in patients in global developmental delay.
MATERIALS AND METHODS

An observational and descriptive study of MRI of the Brain in 100 paediatric patients referred to department of Radiodiagnosis in Chettinad Hospital and research institute for a duration of 2 years from December 2014-december 2016 from Paediatric department for the cause of developmental delay. The patients were diagnosed for developmental delay after taking detailed history. Both sexes were included in the study.

Inclusion Criteria
- Children aged between 3 months 18 years presented with global developmental delay.

Exclusion Criteria
- Children aged more than 18 years.
- Children with known genetic disorder, such as Down’s syndrome, Turner’s syndrome, etc., associated with delayed developmental milestones
- History of head injury.

All the children with developmental delay was subjected to MRI brain, on GE Signa HDxt 1.5 Tesla MRI after making the child sleep or sedated.

Sequences used were: Our routine brain sequence comprises of an axial T1, T2-W, Axial and coronal FLAIR, and coronal and sagittal T1-W images. DWI is acquired in all children and an ADC is calculated using automated computer software and provided for reporting.

The following structures were systematically evaluated following to Widjaja et al. protocol.
2. Corpus callosum: Thickness and morphology.
5. Brain stem: Morphology.
6. Cerebellum: Morphology. The term cerebellar atrophy was used if the cerebellum was small with shrunken folia and large cerebellar fissures or if it had been shown to undergo progressive volume loss. A structure was considered dysplastic if disorganized in development, such as abnormal folial pattern or presence of heterotopic nodules of gray matter.

The findings presented in the MRI reports were divided in six categories:
1. Normal.
2. Metabolic and neurodegenerative diseases such as demyelination
3. Traumatic/neurovascular diseases including hypoxic-ischaemic injury or encephalopathy, periventricular leukomalacia, encephalomalacia, atrophy, and gliosis.
5. Neoplastic diseases.
6. Nonspecific findings includes ventriculomegaly, cavum septum pellucidum, cavum vergae, hypoplasia of corpus callosum, enlarged subarachnoid spaces and delayed myelination.

RESULTS

Normal MRI Findings were seen in 36% (representing 36 cases) of paediatric patients with global developmental delay. Further evaluation was advised for these children to know the cause of developmental delay. Abnormal findings were seen in 64% (64 cases). Further theetiological factors as been classified as traumatic/neurovascular (30%), congenital/developmental (12%), metabolic/degenerative (8%), neoplastic (4%) and nonspecific (10%).

Category II: Includes metabolic/degenerative disease, were found in 8 cases all of which had white matter and ventricle related abnormalities including mucopolysaccharidosis(1 case), cerebral atrophy (4 cases), metachromatic leukodystrophy (1 case), central pontine myelinosis (1 case), and tuberous sclerosis (1 case).

Category III: Includes traumatic/neurovascular diseases of brain. 30 out of 100 patients had traumatic and neurovascular diseases. Among them most common findings were hypoxic ischemic encephalopathy (12 cases), encephalomalacia (8 cases), and periventricular leukomalacia (10 cases).

Category IV: Includes congenital/developmental disorders of brain (12 cases), the findings were corpus calosum agenesis (4 cases), heterotopia (4 cases), chiari malformation (2 cases), and agyria/pachygyria (2 cases).

Category V: Neoplastic category includes 4 cases out of which medulloblastoma (2 cases), pilocytic astrocytoma (1 case), and teratoma (1 case).

Category VI: Non-specific findings were found in 10 cases out of which ventriculomegaly (4 cases), delayed myelination (3 cases), enlarged subarachnoid space (2 cases), and hypomyelination (1 cases).

The other area included in the study were seizures. 30 out of 35 patients with history of seizures had abnormal MRI findings (Table 1 and Figures 1-9).
DISCUSSION

Evaluation of MRI brain was done in 100 paediatric patients with developmental delay of age group three months to 18 years. The proportions of children having abnormal MRI findings in our study of 100 cases could get a definitive diagnostic yield of 64% (64 cases). Similar yield of abnormal MRI has been reported by Momen et al. \(^5\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Abnormal MRI (N=64)</th>
<th>Normal MRI (N=36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical presentation</td>
<td>34</td>
<td>31</td>
</tr>
<tr>
<td>Only developmental delay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developmental delay with seizures</td>
<td>30</td>
<td>5</td>
</tr>
</tbody>
</table>

MRI: Magnetic resonance imaging
Prevalence of developmental delay in children has been reported 5-10%. The determination of cause is important for a number of reasons including prognostication, surveillance and prevention of secondary disability, potential treatment, and appropriate genetic counselling. Apart from clinical history, physical examination, chromosomal analysis and biochemical testing, neuroimaging plays an important role in the etiologic profiling of these developmentally delayed children. Neuroimaging as a second line investigation in patients with developmental delay yields an high variable results from 9-80%. However yield of result increases with specific problems such as microcephaly, focal neurological deficit, seizure disorder. After evaluating the MRI findings, according to the findings we divided them into various etiological factors as described above (Table 2). Momen et al. has classified their MRI findings into etiological categories; in which Traumatic/Neurovascular Diseases (Hypoxic Ischemic Brain Injury) ranked the highest similar to our study followed by congenital/developmental anomalies (12%). The parents of children with congenital/developmental anomalies had consangious marriage and religious belief when proper history was taken. A study done by Momen et al., reported that in their study there was slightly higher incidence of congenital and developmental disease as a cause of developmental delay which could be explained by the religious beliefs that these patients follow, of not terminating the pregnancy in antenatally diagnosed abnormality.

Our present study included 8 cases of metabolic and neurodegenerative, 4 cases of neoplastic origin and nonspecific findings includes 10 cases. A study conducted by Moes et al., also observed similar incidence of Degenerative/Metabolic Diseases causing global developmental delay.

MR imaging is an important part of the comprehensive evaluation of children with developmental delay, as many specific etiologic and pathophysiologic conditions that lead to developmental delay can be detected easily.

**CONCLUSION**

MRI brain study is an effective tool in identifying causative factor in developmental delay children.
high yielding results and should be considered as a second line investigation in children’s with developmental delay. Developmental delay have variety of causative factors which can be identified on MRI and aids the clinician for proper diagnosis, treatment and counselling of the parents. By using advanced MRI techniques such as diffusion tensor imaging, MR spectroscopy, Functional MRI and Tractography helps to yield high results particularly in patients with structurally normal brain.

REFERENCES


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Clinical Correlation of Magnetic Resonance Imaging with Symptom Complex in Prolapsed Intervertebral Disc Disease: A Cross-sectional Study

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Abstract

Introduction: Low back pain results from many causes including degenerative changes, spinal stenosis, neoplasm, infection, trauma, and inflammatory or arthritic processes. Herniated lumbar disc is one of the most commonly diagnosed abnormalities associated with low back pain.

Aim: To evaluate correlation between the clinical features of disc prolapse and magnetic resonance imaging (MRI) finding to determine the clinical importance of anatomical abnormalities identified by MRI technique.

Materials and Methods: The patients aged 18 years to 55 years with low back pain and radicular pain was included in this study. Patients selected were having the clinical features of low back pain with or without radiculopathy and neurological signs. Patients were thoroughly examined neurologically and signs involving motor and sensory dermatomal levels were noted. All the patients underwent MRI investigation with 1.5 tesla machine.

Results: 60.3% of patients in this study had involvement of L5S1 disc disease followed by 34.5% of L4L5 disc disease. The most commonly observed disc herniation was protrusion (35/58 cases-60%), Root involvement is noted only in 33.33% of cases of disc bulge. Among 35 cases of disc protrusion SLR positive in 21 cases (60%).

Conclusion: In our study, the correlation was made between clinical findings and MRI findings. It can safely be concluded that treating physician should put more emphasis on history, clinical examination, and make the inference by these and then should correlate the clinical findings with that of MRI to reach a final diagnosis.

Key words: Disc degeneration, Disc herniation, Magnetic resonance imaging

INTRODUCTION

Even in this modern age, one of the commonest symptoms encountered by the medical practitioners is low back pain, with about 80% of population enduring it during their lifespan.1 Low back ache results from many causes like lumbosacral disc prolapse, degeneration of spine due to age related changes, spinal canal stenosis, trauma, tumour, infections, and arthritic problems. Lumbar disc herniation is common among these etiologies causing the low back pain.2 The same extend of lumbar disc herniation may be asymptomatic in few patients but can cause severe spinal nerve root involvement in others. The final diagnosis of the disc herniation can be a challenge because the exact structures involved which causes the pain and disability in the patient has to be identified.3 Magnetic Resonance Imaging (MRI) which is the investigation of choice for...
lumbar disc diseases has to be correlated with the clinical symptoms complex of the patient. But there is a controversial relationship between the clinical history, MRI imaging findings and the final outcome of the patients with lumbar disc disease. MRI can delineate the alterations in the anatomy and tissue properties of the lumbar disc, which then has to be considered in the clinical context. There is still a moderate correlation between the magnetic resonance imaging of disc herniation and the clinical symptoms. It is important to identify anatomic variations in MRI to correlate with symptom complex of the lumbar disc disease patients. Therefore, a study for correlation between the clinical features of disc prolapse and MRI is necessary to determine the clinical significance of anatomical abnormalities identified by MRI.

**Aim**
To evaluate correlation between the clinical features of disc prolapse and magnetic resonance imaging (MRI) finding to determine the clinical importance of anatomical abnormalities identified by MRI technique.

**MATERIALS AND METHODS**
This study was conducted in Institute of Neurosurgery, Madras Medical College after obtaining proper clearance from Ethics Committee. The patients aged 18 years to 55 years with low back pain and radicular pain was included in this study. Patients selected were having the clinical features of low back pain with or without radiculopathy and neurological signs. Exclusion Criteria: Patients with previous history of Spinal trauma, Infection, Tumour, Lumbar canal stenosis, Spondylolisthesis, Cauda equine syndrome, Myelopathy, Metabolic spinal disease, Radiological multiple level of disc involvement, H/o spinal surgeries and Patients with pacemakers and metal prosthesis in the body were excluded in this study. Patients who were admitted underwent, routine physical examination, hip joint problems, abdominal wall hernia were ruled out. All the neurological symptoms were recorded. Patients were thoroughly examined neurologically and signs involving motor and sensory dermatomal levels were noted. All the patients underwent MRI investigation with 1.5 tesla machine. The findings analysed were the various of Types of Disc herniation-bulge, protrusion and extrusion, Nerve root compression, Modic changes and the disc morphology. The radiological level of involvement with MRI examination was also noted. The results were analysed, the clinical symptoms and signs and the MRI findings were correlated. Statistical study was done to find the association of clinical symptoms complex and the MRI findings.

**RESULTS**
The most common age group affected is between 41-50 years with 21 cases noted among 58 (36.2%). The male patients are more affected than female patients with 39 cases noted among 58 (67.2). With regards to employment patients involved in hard labour work were more affected than patients with sedentary life style (62.1% vs 37.9%). 60.3% of patients in this study had involvement of LL5 disc disease followed by 34.5% of L4L5 disc disease.

The most commonly observed disc herniation was protrusion (35/58 cases-60%), followed by disc bulge (15/58 cases-25.9%) and the least was disc extrusion (8/58 cases-14%) (Table 1). Nerve root compression was noted in only 55.2% of cases of total disc disease.

It was more commonly associated with disc protrusion with 60% of cases of disc protrusion having nerve root compression. When comparing the nerve root compression in protrusion and in the other 2 disc morphologies put together it was note that the two-sided P value is < 0.0001, considered extremely significant. S1 root was most commonly involved 32.8% followed by L5 root involvement -27.6%. Also in few cases poly radicular involvement was noted in 19% of cases. There is no significant correlation between clinically suspected nerve root involvement based on sensory involvement and the radiological level of disc disease (p=0.641). The absence of DTR does not correlate with radiological diagnosis (p=0.083). SLR was positive in 70.7% of cases with disc disease (41/58 patients). Femoral stretch test was positive in 10.3% (6/58) and correlation was highly significant between femoral stretch test positivity and upper level lumbar disc disease. Irrespective of whether motor or sensory or DTR involvement a clinical diagnosis of nerve root involvement correlates significantly with radiological level of disc disease (Table 2).

Root involvement is noted only in 33.33% of cases of disc bulge. And there is highly significantly correlation between root involvement and level of disc disease. Straight leg raising test was positive in 14/15 patient with disc bulge. There was significant correlation between straight leg raising test positivity and presence of disc bulge (p = 0.025) (Table 3).

**Table 1: Types of disc herniation**

<table>
<thead>
<tr>
<th>Disc herniation</th>
<th>Percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulge</td>
<td>30</td>
</tr>
<tr>
<td>Protrusion</td>
<td>60</td>
</tr>
<tr>
<td>Extrusion</td>
<td>14</td>
</tr>
</tbody>
</table>

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There is highly significant correlation between disc protrusion and clinical symptomatology of lumbar disc disease (p value 0.002) (Table 4).

Among 35 cases of disc protrusion SLR positive in 21 cases (60%), there is significant correlation between SLR positivity and disc protrusion (0.027 p value). Motor power was affected and there was 57.1% of disc protrusion and there was significant correlation between loss of motor power and disc protrusion (0.046). Areflexia noted in 9 patients with disc protrusion (25.7%). There was no significant between areflexia and disc protrusion. There was insignificant correlation between disc protrusion vs sensory symptoms (p- 0.531) (Table 5).

There is multiple nerve root involvement in 19% of cases and its association with disc extrusion is statistically significant (p- 0.0042) (Table 6).

**DISCUSSION**

In this study each clinical finding was individually analyzed and tried to correlate with capability to predict the radiological level.

When the patient has a motor weakness, it has the highest correlation with radiologic level noted on MRI (p – 0.000). Sensory deficit based on the dermatome does not correlate significantly with the radiologic level (p- 0.641). Similarly the loss a deep tendon reflex is unable to predict the radiological level involved but has a better correlation than loss of sensation (p- 0.083).

Straight leg raising test is positive in most of the cases (70.7%) but is not helpful in diagnosing the radiological level of disc involvement. In Cochrane database systemic review, van der Windt DA et al. has noted that SLR is a highly sensitive and variably specific test in localizing the Lumbar disc disease. But when femoral stretch test is considered, it is not positive in all cases of lumbar disc disease but when femoral stretch test is positive it has a very high correlation for a possibility of a higher level lumbar disc involvement (p- 0.000).

When all the clinical findings noted in a patient were combined and analyzed in this study, clinical evidence of nerve root involvement (radiculopathy) correlates very well with the MRI level of disc involvement (p- 0.000).

On the other hand in this study analysis was also done between different types of disc morphology and various clinical presentations noted in each of them.

In patients with disc bulge alone radiculopathy was not noted in most of the cases (66%). But in those patients in whom radiculopathy was noted they correlated very well with radiological level of disc involvement (p-0.000) but nerve root compression could not be identified on the MRI. Among the two most efficient classification systems of lumbar disc herniations, namely ‘Combined Task Force classification’ and ‘van Rijn Classification’, the CTF classification divides lumbar discs as normal, focal protrusion, broad-based protrusion and extrusion. The CTF classification excludes the disc bulge as a source of confusion and disagreement.

Straight leg raising test was positive in 93.34% of the cases indicating that low back ache and sciatica was more common than radiculopathy in cases of disc bulge. A dynamic MRI could have given a better picture regarding nerve root prolapse.
compression in cases of radiculopathy which could not be done in this study which is one of the limitations of this study. Tarantino et al.,\textsuperscript{8} have emphasized the need for upright MRI, to identify occult disc degeneration in patient with chronic back pain with normal recumbent MRI. Also other causes of radiculopathy needs to be considered when nerve root compression is not noted on MRI.

Table 5: Disc protrusion vs SLR

<table>
<thead>
<tr>
<th>Disc herniation – protrusion</th>
<th>Percentage of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight leg raise test</td>
<td>60</td>
</tr>
<tr>
<td>Power - LL</td>
<td>57</td>
</tr>
<tr>
<td>DTR</td>
<td>26</td>
</tr>
<tr>
<td>Sensory level</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6: Disc extrusion vs multiple nerve root involvement

<table>
<thead>
<tr>
<th>Extrusion present</th>
<th>Single root</th>
<th>Multiple root</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrusion present</td>
<td>3 (5%)</td>
<td>5 (9%)</td>
<td>8 (14%)</td>
</tr>
<tr>
<td>Extrusion absent</td>
<td>44 (76%)</td>
<td>6 (10%)</td>
<td>50 (86%)</td>
</tr>
<tr>
<td>Total</td>
<td>47 (81%)</td>
<td>11 (19%)</td>
<td>58 (100%)</td>
</tr>
</tbody>
</table>

In patients with disc protrusion radiculopathy was noted in all patients and it had a very high correlation (p-0.002) with presence of disc protrusion. Among the various symptoms associated with disc protrusion loss of motor power had best correlation (p-0.046) in predicting the level of disc disease. Sensory loss and areflexia were not significantly related in predicting the level of disc disease. In our study, there is no significant correlation between sensory loss and areflexia. Straight leg raising test was positive in 60% of the cases of disc protrusion and was significantly associated with predicting the presence of disc protrusion (0.027).

Though radiculopathy was present in all cases of disc protrusion only in 60.3% of cases there was radiological evidence of nerve root compressing again stressing the significance of a dynamic MRI. Gilbert J et al.,\textsuperscript{9} have noted how the diagnosis of disc protrusion was made in 50.1% of patients in conventional MRI and 73.3% were found to have disc protrusion with open Upright MRI, after a retrospective study in 1468 symptomatic patients, again emphasizing for dynamic MRI. Even though disc protrusion is noted on MRI if no nerve root compression

![Figure 1: Lumber disc disease suspect](image)
is noted, other causes of radiculopathy will have to be considered.

Disc extrusion was also associated with radiculopathy along with positive straight leg raising test. In few studies, it has been shown that disc extrusion can have more clinical symptoms and high disability (Dora C et al.11). In our study, 77.1% of the disc extrusion patients are symptomatic, more so with pain (Pfirrmann CW et al.10), more than disc bulge and disc protrusion. But based on the clinical features it was unable to predict the level of disc involvement (p - 0.164). The reason behind this probably could be because of multiple nerve root involvement associated with disc extrusion. In 62.5% of cases of disc extrusion more than one nerve root was involved. When clinically more than one nerve root involvement is suspected then the chances of having an extruded disc is very high (p – 0.0042). Apart from having the multiple nerve root involvement and highly symptomatic patients, the disc extrusion also has high failure rates for conservative treatment and they should be priority candidates for surgery along with patients with, the laterally placed discs and the discs with larger fragments. The proposed algorithm for management of Lumbar disc disease (Figure 1).

CONCLUSION

In a patient with lumbar disc disease clinical features of radiculopathy is highly suggestive of the level of disc disease. Among the features of radiculopathy it is the loss of motor power that is very useful in predicting the level of disc disease. Disc bulge less often presents with radiculopathy. But if radiculopathy is noted in cases of disc bulge, a Dynamic MRI may be needed to look for nerve root compression and hence can influence surgical decision. In lumbar disc disease if single level radiculopathy is noted then, disc protrusion is the most likely disc morphology suspected. Among the clinical features of radiculopathy, it is loss of motor power which is again highly predictive of level of disc protrusion. In cases of disc protrusion on MRI look for nerve root compression. If it is not observed then Dynamic MRI may be suggested to look for nerve root compression based on which surgical decision can be taken. Disc extrusion presents with radiculopathy but more than one root may be involved. If clinical features are suggestive of more than one root involvement then disc extrusion is more likely on a MRI.

REFERENCES


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Peadiatric Trauma In A Tertiary Care Teaching Hospital

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Abstract

Introduction: Pediatric trauma is a major cause of mortality and disability worldwide and accounts for significant socio economic burden in developing countries.

Aim: To assess the various epidemiological parameters that influences the causation of trauma and outcome of trauma in the paediatric age group.

Methods: Prospective study of 142 patients of less than 12 years age, was carried out over a period of 3 months (1st July to 30th September), and information regarding the following parameters were assessed: Age group, Sex, mode of trauma, type of injury, place where the trauma occurred and the overall mortality as well as morbidity.

Results: Majority of the paediatric trauma cases were seen in the school going age group (6-12 years). In male children RTA was the most common mode of trauma followed by fall from height, and thermal injuries. Roads and streets were found to be the place where maximum trauma occurred followed by Home. Overall mortality was found out to be.

Conclusions: Paediatric trauma is a public health issue. By assessing the epidemiology of paediatric trauma, we conclude that majority of paediatric injuries are preventable and paediatric epidemiological trends differ from those in adults. Hence preventive strategies should be adopted in paediatric patients on the basis of these epidemiological trends.

Keywords: Fall injury, Pediatric trauma, Road traffic accident

INTRODUCTION

Paediatric trauma is defined as any physiological damage to the body of children resulting from abrupt exposure to forces or the lack of warmth or oxygen1. It is a common cause of morbidity and mortality2. National Crime Records Bureau (NCRB) report reveals that there were 22,776 deaths (<14 years) due to injuries among children3 which contributes to 15-20% of total trauma deaths. In India accidental fall is more common. The national safety council documents that 10% of the individual who die of accidental death are children below 12 years of age accounting for 46% of all paediatric death which is more than that of cancer, congenital anomalies, etc. It is the leading cause of mortality in children with almost seven children in one lakh of the population being died per year (office of population census and survey, 1991).4 Head injury is present in majority of cases and accounts for 75% of deaths. Injury mechanisms vary with age. In infants, non-accidental injury (NAI) is most common, whereas for toddlers, falls are the predominant injury mechanism. In older children and adolescents, road traffic accidents (RTAs) and sports injuries are predominant.5 In children motor vehicle collisions involving car occupants and pedestrian are the common causes of accidental death (20%) and burns (5%) accounting for significant segment of the remaining group. The injuries which cause such major problems are CNS injury, thoracic injury, abdominal trauma, renal injury & pancreatic injury6.
Its management has improved considerably over the past 30 years; whilst there will always be some injuries incompatible with life, effective early care can significantly reduce the morbidity and mortality. Infall injuries, potential energy due to height is converted to kinetic energy under the influence of gravity and at impact some of this energy is imparted to the body and this results in injury. Every organ system is involved in the pathophysiological response to burn injury and its magnitude is proportional to the extent of the cutaneous injury plateauing at approximately 60% Body Surface Area burn. Local cutaneous effects are influenced by the temperature of the wounding agent and the duration of contact. Motor vehicle accidents with acceleration/deceleration forces result in a diffuse injury, whereas trauma produced by low velocity focal contact injuries will produce local injury.

Head injuries in young children result in special physiological response due to Structural differences in a thin, flexible and elastic skull capable of undergoing much deformation, open fontanelles and sutures, a large subarachnoid and extracellular space, immature developing brain, more water content of brain, incomplete myelination, low ratio of brain to CSF, low cerebral blood flow and cerebral metabolic rate for oxygen.

Very few studies/data exists about the epidemiology of Paediatric trauma. Detailed assessment of epidemiological factors related to the causing agent, host

**AIM**

To assess the various epidemiological parameters, pattern of trauma and type of injury that influence the causation of trauma as well as the consequent morbidity and mortality among the paediatric population.

**MATERIALS AND METHODS**

This was a prospective study conducted at a tertiary care hospital over a period of three months. After getting the approval from the institutional ethical committee the study was commenced. A total of 142 patients (age up to 12 years) with the history of trauma admitted at the casualty ward in the period of (1st July-30th September) were included. Age above 12 years was excluded from this study. Bites, drowning and poisoning cases were excluded from this study. A detailed history taking (from patients/relatives/children) was done and all the patients were assured with regards to their age, sex, mode of trauma and mortality. The children were classified according to age as: Infants (upto1year), toddlers (1-3 years), Pre-school (3-6years) and school going children (6-12 years). Modes of trauma were divided into subgroups: Head injury, abdominal injury, thorax and bony injury. The places of trauma were divided into the following home, road/street, playground, school.

**RESULTS**

In the period of two months, 142 paediatric patients have been admitted. School going children were the most commonly injured (58.45%). Males outnumbered females in a ratio of 2.3:1. Children mostly suffered from orthopedic injuries (46.96%). RTA (53.52%), followed by Accidental fall (33.80) and Burns (7.04%) were the most common mode of injury leading to paediatric trauma. Road Traffic Accident. It affected mostly school going children. Most fall injuries occurred at home followed by road/street. In home/playing area, common place of fall was from tree. Out of 76 children involved in RTA, 38.15% were pedestrians, 40.78% were passengers, and 21.05% were pillion riders. Out of total 10 thermal injury patients, 1 was infant, 2 patients belonged to the toddler age group, 3 were preschool & another 4 from school going age group. Thermal injury due to scalds (hot liquids) accounted for 60% and contact burns 40%. Out of the 142 patients admitted, 4 died (2.81%) - 3 Male and 1 female. Among the four deaths reported, 3 were from school going age group and one was infant. The cause for death was RTA with head injury in 2 cases and Major Burns with Sepsis in 2 cases (Figures 1-3).

**DISCUSSION**

Trauma should be considered as a disease and its accidental connotation to be rooted out. Hence more research on epidemiological factors related to the causing agent, host
and environment is required. This study was done for the above purpose. Prevalence of childhood trauma is high. Tandon et al.\(^1^1\) reported a prevalence of 14.2% and another study done at Naraingarh, India,\(^1^2\) reported a prevalence of 5.5%. Many studies have been done from Bangladesh,\(^1^3\) Iran,\(^1^4\) Nigeria,\(^1^5\) Thailand,\(^1^6,1^7\) and Singapore\(^1^8,1^9\) and from major Indian cities.\(^2^0-2^3\) These studies have found boys to be more commonly injured than girls. Home was found to be the most common place of injury, followed by road/street, with accidental falls being the most common mechanism of paediatric trauma. In our study too boys were more commonly hospitalized than girls, probably boys are given more freedom as well as free hand to work or play outside their homes and boys likes to explore the environment than girls. In our study male to female ratio was 2.3:1 which is similar to 1.5 to 3:1\(^2^4, 2^5\) reported in above studies.\(^1^5, 2^4, 2^5\) School going children were the most common age group found to be affected in our study, which is also similar to that reported in other previous studies.\(^1^4,2^3,2^5\) But in our study majority of injuries occurred at road/street followed by home. Studies from Ethiopia and Nigeria\(^1^5, 2^6, 2^7\) all found the home environment to be the most common place for a childhood injury to occur. In our study Road Traffic Accidents were the leading cause of trauma in all age groups, followed by fall injuries. In our study most of the victims of RTAs were passengers, followed by pedestrians.\(^1^4, 2^8\) In our study, a vast majority of burn injuries occurred from hot liquids followed by contact burn.\(^2^9, 3^0\) In our study, mortality cases admitted in our hospital are from 6-12 years age group. Mortality due to RTA and thermal injuries were of equal incidence in our study.

**CONCLUSION**

Differences in injury pattern and mortality exists between different age groups and High risk injury pattern can be identified by this study. This study gives an idea about the epidemiology of paediatric trauma, with 6-12 years age group found to be the most affected as well as the vulnerable with regards to overall mortality. Road/street was the most common place of injury, and RTAs were the most common mechanisms of injuries. We conclude

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**Table 2: Common modes of injury**

<table>
<thead>
<tr>
<th>Modes of injury</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTA (n=76)</td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>29 (38.15)</td>
</tr>
<tr>
<td>Passenger</td>
<td>31 (40.78)</td>
</tr>
<tr>
<td>Pillion rider</td>
<td>16 (21.05)</td>
</tr>
<tr>
<td>Rider (any vehicle)</td>
<td>0</td>
</tr>
<tr>
<td>Burns (n=10)</td>
<td></td>
</tr>
<tr>
<td>Scalds</td>
<td>6 (60.00)</td>
</tr>
<tr>
<td>Contact burns</td>
<td>4 (40.00)</td>
</tr>
</tbody>
</table>

RTA: Road traffic accident

**Table 3: Distribution of paediatric trauma cases according to mode of injury**

<table>
<thead>
<tr>
<th>Modes of Injury</th>
<th>Age (years)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-1</td>
<td>1-3</td>
</tr>
<tr>
<td>Accidental fall</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>RTA*</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Thermal injury</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Assault</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

RTA: Road traffic accident

**Table 4: Area involvement in RTA&fall injuries**

<table>
<thead>
<tr>
<th>Types of injury</th>
<th>Age (years)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-1</td>
<td>1-3</td>
</tr>
<tr>
<td>Orthopedic</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Head</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Abdomen</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Chest</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Genital</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

**Figure 1: A case of accidental fall (abdominal injury)**

**Figure 2: A case of road traffic accident**
that majority of paediatric injuries are preventable and paediatric epidemiological trends differ from those in adults. This is study is very useful for adopting preventive strategies and directing ongoing care of severely injured children.

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Fenticonazole Nitrate - A Symptomatic Approach to Vulvovaginal Infection

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Abstract

Abnormal vaginal discharge is a characteristic feature of vulvovaginal infections (VVI). It affects women of reproductive age group worldwide. The most common documented causes of symptomatic vaginal discharge include bacterial vaginosis, followed by vulvovaginal candidiasis and trichomoniasis. The relapse and recurrence rates are increasing due to the use of complex regimens with long treatment duration. Fenticonazole nitrate is an imidazole derivative with a broad spectrum of antymycotic activity against dermatophytes and yeasts in vitro and clinical studies. Fenticonazole has also shown to exhibit antibacterial action against bacteria commonly associated with superficial fungal and vaginal infections and anti-parasitic action against the protozoan Trichomonas vaginalis with high cure rates and good safety and tolerability with low relapse rates. Fenticonazole shows unique multimodal action against Candida species by Inhibiting of secretary aspartate protenase thereby preventing the growth, adherence, and penetration of Candida sp. including N-acetylcysteine leading to clinically significant reduction in the relapse rate. Similarly, fenticonazole inhibits the growth of bacterial (Gardenella vaginalis) and Protozoan (Trichomonas sp.) by inhibition of pyruvate oxidoreductase enzyme responsible for cell division or replication. Clinical evidences have shown that fenticonazole does not have any teratogenic effects and has been suggested to be used in high-risk cases from second trimester onward. Fenticonazole is a differentiated imidazole derivative that offers simplistic solution for syndromic approach to VVI infections.

Key words: Fenticonazole nitrate, Gardenella vaginalis, Trichomonas, Vulvovaginal candidiasis, Vulvovaginal infections

INTRODUCTION

Abnormal vaginal discharge is a frequent complaint for women of childbearing age that is often accompanied with inflammatory symptoms. The situation is compounded or complicated by the concomitant risk factors and current lifestyles adopted by population at large including tight clothing, poor menstrual hygiene, douching, smoking, antibiotic use, oral contraceptive pills (OCPs), and Type 2 diabetes. In most of these cases, the diagnostic challenges for empirical therapy are well highlighted by the overlapping symptoms representing either candidiasis, bacterial or Trichomonas infections. Similarly, the increasing incidence of relapse or recurrence in these cases has often necessitated the use of complex regimens with long treatment duration notwithstanding the wide availability of conventional therapies including topical azoles.

Fenticonazole is a differentiated imidazole derivative that has been made available in India recently for the management of symptomatic vulvovaginal infections (VVI) including vulvovaginal candidiasis (VVC). The unique dechlorinated imidazole structure has been documented to have fungicidal yet broad spectrum activity against dermatophytes, yeasts, Protozoa, and Bacterial sp.23

PHARMACODYNAMICS

Fenticonazole shows unique multimodal action against Candida species involving:
1. Inhibition of secretary aspartate protenase (SAP) there by preventing the growth, adherence, and penetration of Candida sp. including N-acetylcysteine leading to clinically significant reduction in the relapse rate (Figure 1).
2. Inhibits fungal cytochrome P450 3A enzyme, lanosine 14α-demethylase responsible for conversion of lanosterol to ergosterol, the main sterol attributed to fungal cell membrane integrity and cell survival.

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3. Inhibits complimentary oxidase and peroxidase enzymes that lead to structural and functional changes in fungal cell due to its antioxidant action.

Similarly, fenticonazole inhibits the growth of bacterial (Gardenella vaginalis) and Protozoan (Trichomonas sp.) by inhibition of pyruvate oxidido reductase enzyme responsible for cell division or replication.²

PHARMACOKINETICS

The systemic absorption with topical fenticonazole is nominal while the preclinical studies suggest excellent retention or “intrareservoir” effect in the local tissues for up to 72 h following topical application.⁴,⁵

CLINICAL DATA

Clinical efficacy of topical fenticonazole has been evaluated in 17 randomized controlled clinical trials for various clinical states involving Candida sp., Gardenella, and Trichomonas in approximately over thousand patients.

1. In randomized comparative clinical trial with clotrimazole, fenticonazole was documented to have better clinical and mycological cure rates with significantly longer disease-free interval rates at 4 weeks following singly topical application of 600 mg ovule (Lawrence) (Figure 2).⁶

2. Fenticonazole (600 mg X 2 dose) offers “Quick Symptomatic anti-pruritic” effect compared to Fluconazole (150 mg X 2 dose) because of its complimentary anti-SAP action as highlighted by Murina et al. when administered in high-risk VVC patients on concomitant OCP.

3. Clinical efficacy of topical fenticonazole in VVI cases was documented by Bukovsky.⁸,⁹ Trichomoniasis (100%); Candida (48.7%); and other (34.8%) pathogens were identified at baseline visit and following single dose administration patient responder rates were documented at 87% at the end of 7 days (Figure 3).

The clinical utility and safety of combination strategy involving fenticonazole (600 mg ovule) and fluconazole (150 mg tablet) was documented by Kovachev in 118 relapsing or naive cases of VVC. At the end of 2 weeks, patient response rates were noted in 90.7% cases. The combination strategy showed better clinical and mycological cure rates with no incremental rise in treatment related adverse events (Figure 4).

In randomized, single-center comparative study between fenticonazole ovules (200, 600, and 1000 mg) was done to see the intravaginal reservoir effect. At 3 h., the 600 mg ovule provided the highest concentrations compared to 1000mg. This study was documented by Gorlero (8) (Figure 5).

SAFETY

Risk of VVI including VVC remains higher during pregnancy. The real world challenges of clinical diagnosis in such persistent cases often warrants the use of
complex treatment regimens including those involving metronidazole or oral triazoles that may be best avoided during pregnancy. Women with VVC in pregnancy can be treated with topical imidazoles as per Faculty of Sexual and Reproductive Healthcare Clinical Guidelines by British Association for Sexual health and HIV. Pre-clinical studies have shown that fenticonazole does not have any teratogenic effects and has been suggested to be used in pregnancy from second trimester when the benefits outweigh the risk involved in such cases.¹¹

**DOSAGE AND ADMINISTRATION**

Fenticonazole 600 mg intravaginal ovule is usually administered by deep insertion once at bed time. The dosage may be repeated on the 3rd day if the symptoms persist.²

**SUMMARY**

VVI including symptomatic, relapsing, and uncomplicated VVC remains a clinical enigma with overlapping symptoms and diagnostic challenges. This often requires simplistic, holistic treatment regimens as empirical therapy that could be realistically applicable in real world outpatient settings of India. Fenticonazole is a novel imidazole with unique mechanism of action that covers a wide spectrum of organisms including *Candida* sp., *Gardnella vaginalis*, *Trichomonas vaginalis* and consequently clinically documented with high responder rates in patients with VVI. In most of these cases, fenticonazole offers short course therapy benefits that can be safely given to high-risk patients including pregnancy albeit from second trimester onward.

**REFERENCES**

Vascular Hamartoma of Cerebellopontine Angle: A Rare Case Report

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Abstract

Cerebellopontine angle (CPA) hamartoma is rare. Roughly, 90% of CPA tumors are acoustic neuromas. Other prevalent lesions include meningiomas and epidermoid tumors, and additional lesions are rare. We present a case of 12-year-old girl who presented with left-sided hearing loss of more than 1-year duration with vertigo since childhood and headache. Magnetic resonance imaging revealed a brilliantly enhancing lesion in the left CPA extending through tent in the supratentorial region. Lesion was eroding the posterior petrous and occipital bone, extending into the subgaleal planes, causing hydrocephalus. Computed tomography imaging shown hyperdense lesion in the left CPA. She opted for surgery, lesion excised and pathology confirmed a diagnosis of left-sided CPA hamartoma (vascular). Neurosurgeons and otolaryngologists should be familiar with this uncommon tumor and include it in the differential diagnosis of CPA lesions.

Key words: Cerebellopontine angle, Hamartoma, Hydrocephalus, Meningioma, Ventriculoperitoneal shunt

INTRODUCTION

Cerebellopontine angle (CPA) tumors are a relatively rare entity and typically are either idiopathic or due to spontaneous mutations of several genes. About 90% of CPA tumor are neuromas.\textsuperscript{1} Intracranial hamartomas do not occur frequently. Most of the hamartomas are usually asymptomatic and generally found at autopsy, computed tomography (CT) or magnetic resonance imaging (MRI) scan. The most frequently hamartomas located in CPA are asymptomatic therefore most often encountered in surgical cases.

CASE REPORT

We reported a case of 12-year-old girl, brought to the pediatric Neurosurgery Department with complaints of headache and vomiting since 1-month duration. The symptoms were aggravated since the since 10 days. The patient also presents with gait ataxia for the past 10 days duration. On examination, it was found that patient was conscious, oriented with Glasgow coma scale of 15/15 and no focal neurological deficits. There were dysmetria and dysdiadochokinesia present on left side of body.

Following that, the patient underwent surgery of left combined pre- and retro-sigmoid approach and excision of tumor along with right ventriculoperitoneal shunt and Chhabra shunt medium pressure. Intraoperatively, there was gray-brown mass of tissue occupying left CPA with extension to supratentorial area and toward 4\textsuperscript{th} ventricle. Histopathology of specimen shown with gross features consists of multiple irregular gray-brown masses of tissue together measuring 4 cm × 3 cm. Microscopically,
specimen section shows fibrocollagenous tissue and dilated vascular channels with large areas of hemorrhage and hemosiderin laden macrophages, with impression of vascular hamartoma with hematoma.

**DISCUSSION**

Most common CPA tumor is schwannoma and over 90% of them arise from superior vestibular nerve. Others are meningiomas and cysts of posterior fossa. Rare tumors are cranial nerve neuromas and vascular tumors. The patient may present with hearing loss for long duration and vertigo since childhood. After excluding other differential diagnosis, the more plausible explanation would be non-traumatic hamartomatous origin. In fact finely distributed, prominent vascular component represents a strong clue to the hamartomatous nature of the lesion. Hamartomatous tissue containing neuroectodermal elements may have become separated from the developing neuraxis during neural migration. Hamatomas should be considered when masses are discovered originating from eighth nerve other than superior vestibular nerve and when magnetic resonance signal characteristics vary from the T1 enhancement typically seen with schwannomas and meningiomas. Hamartomas are rare lesions and most were described as case reports or small series. Rare lesions are described as lipomas of the internal auditory canal are lipomatous hamartomas. However, given the finely dispersed vascular components and absence of other tissue elements, we suggest the term vascular hamartoma for this peculiar lesion to alert to high vascularity that might suggest a more serious pathology on imaging procedures.

**CONCLUSION**

We described an unusual case that we believe to represent the description of a vascular hamartoma of CPA. Pathogenesis of this rare lesion at this location remains unknown. Hamartomas should be included in the pre-operative differential diagnosis of CPA tumors.

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How to cite this article: Munireddy MV, Prasad KK, Murthy P. Vascular Hamartoma of Cerebellopontine Angle: A Rare Case Report. Int J Sci Stud 2017;5(5):273-274.

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Ophthalmic Involvement in Rheumatoid Arthritis: A review

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The slit lamp examination was suggestive of nodule at nasal side of the left eye along with inflammation of scleral vessel pointing toward nodular anterior scleritis. Rest anterior segment findings were within normal limits. Posterior segment was examined after papillary dilatation, and there was no evidence of scleritis in the posterior segment. He was started on topical steroid eye drop prednisolone 1% qid along with other systemic treatment. Next, follow-up was planned after 1 week.

The patient was stabilized with oxygen therapy, intravenous diuretics and steroids along with disease modifying antirheumatic drugs. His investigations were strongly positive serum RA factor (320 IU/ml) and raised C-reactive protein (48 mg/L); renal function tests and liver function tests were within normal limits except for low serum albumin (2.52 g%) and raised globulins (5.2 g%); hemoglobin of 12 g%, total leukocyte count 12,320/ml, platelet count 2.9 lacs/ml, and cardiac enzymes were normal. Echocardiography revealed dilated left ventricle, moderate aortic regurgitation and impaired left ventricular ejection fraction approximately 20%. His nerve conduction studies were normal except for the mild reduction of nerve conduction velocity in bilateral peroneal nerves.

Thus, this patient was managed as RA with left eye scleritis with oral and topical steroids with disease modifying antirheumatic drugs.

CASE REPORT

A 54-year-gentleman, who was a known case of rheumatoid arthritis (RA) and dilated cardiomyopathy, visited outpatient department with complaints of redness of the left eye with discomfort and dull pain for past 6 months. The patient was on oral and topical steroids, disease modifying antirheumatic drugs (methotrexate, sulfasalazine, and hydroxychloroquine) in addition to antiplatelets, ramipril, and diuretics. The patient said he becomes breathless even on walking few steps; however, he had no orthopnea/paroxysmal nocturnal dyspnea/anginal chest pain. He had significant early morning joint stiffness and was unable to move freely due to severe pain in knee joints. General examination revealed cushingoid habitus and pitting pedal edema. The patient had rheumatoid nodules over extensor aspect of elbows and clinically evident synovitis involving several small joints of hands/feet as well as large joints, viz., knee, elbows, and shoulder joints. He had basal creps and rest of systemic examination was normal.

The patient was evaluated by an ophthalmologist for complaints of redness of the left eye for past 6 months. The slit lamp examination was suggestive of nodule at nasal side of the left eye along with inflammation of scleral vessel pointing toward nodular anterior scleritis. Rest anterior segment findings were within normal limits. Posterior segment was examined after papillary dilatation, and there was no evidence of scleritis in the posterior segment. He was started on topical steroid eye drop prednisolone acetate 1% qid along with other systemic treatment. Next, follow-up was planned after 1 week.

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Thus, this patient was managed as RA with left eye scleritis with oral and topical steroids with disease modifying antirheumatic drugs.

**Abstract**

Ophthalmic involvement in rheumatoid arthritis (RA) can be mild discomforting as in dryness of eyes/redness as a part of secondary sjogren or episcleritis, or it may even evolve into the cause of serious discomfort and vision threatening illness such as scleritis, peripheral ulcerative keratitis, or retinal vasculitis. Apart from above, ophthalmic involvement as a result of steroids (cataract/glaucoma), hydroxychloroquine (retinopathy) and others is equally important. This case report and review deal with primary ophthalmological involvement in RA.

**Key words:** Episcleritis, Keratitis, Rheumatoid arthritis, Scleritis
INTRODUCTION

RA is the most common joint disease with inflammatory; it generally affects 1-2% of the population worldwide. RA has female gender predilection with females being affected 2 to 3 times more commonly than males. RA can involve other tissues and organs as well as synovial joints. It involves inflammation of synovial tissue and involvement of peripheral joints, hand, feet, and wrists symmetrically. The nonarticular muscular structures such as tendons, ligaments, and fascia also get involved in RA. Apart from the involvement of joint, there are various extra-articular manifestations reported, including rheumatoid vasculitis, rheumatoid nodules, ocular involvement, neurologic, digestive system involvement pleuropulmonary, cardiovascular, cutaneous, and hematologic complications. This review article aims at ophthalmic association of RA. Ophthalmic manifestations of RA include dry eye syndrome, keratitis, episcleritis, and scleritis.

Scleritis

Scleritis is an uncommon yet painful blinding ocular condition. It should always be kept as a differential diagnosis in cases with red eye. Scleritis is defined as inflammation of the opaque outer eye wall or sclera. Scleritis is associated with systemic disease in around 40% cases, and RA is most common disease associated with scleritis. It is seen commonly in middle-aged women, bilateral involvement 50% of cases, but it may not present with symmetrical involvement. Apart from sclera other adjacent structures such as the episclera, cornea, and uvea can also be involved. In an about 10% of the patient it may get complicated with blindness.

There are higher chances of blindness with severe disease with inadequately treated. Scleritis occurs in 1-6% of patients with RA and up to 14% of patients with rheumatoid vasculitis. RA is seen in 10-19% of patients with scleritis and scleritis affects 0.2-6.3% of all patients with RA. Diagnosis of RA precedes the onset of scleritis in almost 90% of cases. Scleritis in case of RA is a bad prognostic factor as it is one of the extra-articular conditions associated with increased risk of mortality, mainly with necrotizing scleritis or peripheral ulcerative keratitis (PUK) with RA.

Scleritis often starts unilaterally in most of the cases; the condition is bilateral in 40-50% of cases. The pain in eyes is aggravated with movements due to insertion of the eye muscles into the sclera. Pain is severe enough to keep the patient awake. Pain can spread to the jaws, along with the distribution of the trigeminal nerve. Scleritis can present with other conditions such as photophobia, tearing, and blindness. It is classified into anterior (90%) or posterior (10%) depending up the involvement of ocular structure depending on the site of inflammation either in front of or behind the ora serrata.

Anterior scleritis further divided into diffuse or nodular scleritis and necrotizing or non-necrotizing forms with or without inflammation. Scleromalacia perforans is not seen frequently in modern day practice, due to better availability of treatment for RA. Necrotizing anterior form is rarest and most severe, forms of scleritis. Necrotizing scleritis is associated with severe long-standing RA. The eyes presents with redness, but cases of isolated posterior scleritis may not present with redness. On slit lamp examination scleral edema, dilatation of the superficial and deep episcleral blood vessels is seen. With the instillation of vasoconstrictor eye drops (phenylephrine), the redness persists but in cases of episcleritis redness vanishes.

Treatment

Nonsteroidal anti-inflammatory drugs (NSAIDs)

In contrast to episcleritis, scleritis generally do not respond to topical treatment such as steroid and anti-inflammatory eye drops. Apart from nodular anterior scleritis which respond to oral NSAID, other forms responds poorly.

Corticosteroids

Oral corticosteroids are used as the first line of management. In cases with vision threatening complications like scleral perforation, it is advisable to give intravenous boluses of methylprednisolone (1 g/day for 3 days), followed by an initial dose of 1 mg/kg/day prednisone equivalent.

Immunosuppressants

Although oral corticosteroids are the first line of management for scleritis associated with RA, 26-38% of patients with scleritis still requires immunosuppressive therapy in addition to oral corticosteroids. In the aggressive form of disease like necrotizing forms of rheumatoid scleritis immunosuppressants along with oral corticosteroids are served as the first line of management. Apart from cases with an aggressive form of scleritis immunosuppressants can be used in corticosteroid resistance cases, corticosteroid dependent cases or to taper doses of corticosteroids. Commonly used drugs are methotrexate azathioprine, mycophenolate mofetil, and cyclosporine.

Biologic agents

These have been tried for RA but have been shown to have limited success. Various agents that can be tried are tumor necrosis factor inhibitor infliximab, rituximab monoclonal antibody directed against CD20, and anakinra, an antagonist of the interleukin 1 receptor. Success rates are variable.
with these agents and should be tried in cases refractory to at least one line of an immunosuppressive agent.

**PUK**

PUK is rare with RA with an incidence of 3/million population per year and found in the peripheral cornea near the limbus. The cornea is an avascular structure that is why it is not exposed to vascular system and inflammatory cells. However, the peripheral cornea because of its proximity to the limbal conjunctiva can derive inflammatory mediators from limbal vessels. It is characterized by progressive thinning of the peripheral cornea due to immune complex associated. This thinning is due to the release of collagensases and proteases enzymes in the area which is in conjugation with of the limbal vessels and cornea. This leads to lysis of corneal tissue surrounding the vessels which can be with or without ulceration. Patients may not give active complaints in the affected eyes. Patients with PUK can complain of decreased vision, tearing, irritation, and pain. In severe cases, corneal perforation can also be seen.

Examination will classically show crescent shaped peripheral corneal lesions with pooling of fluorescein and stromal thinning. If uncontrolled, PUK can progress to corneal melt which is a sterile avascular breakdown of corneal collagen fibers secondary to significant inflammation. Corneal melt is of great concern as it has the potential to lead to globe perforation and the loss of the eye. It is important to note that PUK is not specific to RA and can be seen in other systemic inflammatory conditions.

**Episcleritis**

Episcleritis is a benign inflammation of the superficial layers of the sclera. Episcleritis causes red eyes, which are often described as “salmon” pink in color. In 4-10% of RA patient, episcleritis can be found. Episcleritis can manifest in two forms the simple episcleritis and the nodular episcleritis. The nodular form has the subconjunctival nodules these nodules are mobile over the sclera. The simple (diffuse) episcleritis is more commonly observed variety. The patient presents with sudden onset redness in eye or eyes, mild photophobia and discomfort; visual acuity is unaffected in episcleritis. Apart from these symptoms, mild radiating pain along cheek-eyebrows temples can be seen. In contrast to scleritis tenderness on palpation is absent in episcleritis.

**Treatment**

Episcleritis is a self-limiting condition. Topical/oral steroids or NSAIDs can be used as the treatment of episcleritis for relieving discomfort and halting progression of disease. Keratoconjunctivitis sicca (dry eye syndrome)

It is defined as a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance and tears film instability with potential damage to the ocular surface, accompanied by increased osmolarity of the tears and inflammation of the ocular surface. Is the most common ophthalmic feature associated with of RA is dry eye disease. Because by T and B lymphocytes infiltration of the lacrimal gland. Due to this infiltration, there is secondary atrophy of the gland which manifests as dry eye. In dry eye syndrome reduces aqueous secretion by both principal and accessory lachrymal glands. In case where treatment is not done will lead to development of superficial perforated keratitis, filamentous keratitis and corneal ulcers.

The patient may have many symptoms such as minor irritation and pricking of the eyes, a sensation like having sand in the eyes continues sensation of burning in eye, less or no tears, redness, photophobia, and itching superficial keratitis, diminution of vision because of epithelial lesions or corneal opacity. There are two different types of dry eye disease due to any cause seen, (1) dry eye syndromes with decreased secretion of lacrimal gland (because due to damage to the principal lacrimal glands) and (2) dry eye syndromes resulting from increased evaporation of tear (abnormal tear film due to damage of the accessory lacrimal glands, the meibomian glands, or the mucin glands). The severity of the symptoms correlate with the age and duration of RA.

Tear production of the lacrimal gland can be evaluated with Schirmer’s test. It is done by first drying the tear film, then inserting a Schirmer strip into the lower conjunctival cul-de-sac at the junction of medial 2/3rd and lateral 1/3rd. At the end of 5 min, if the strip measures < 10 mm of wetting, the lacrimal glands are not functioning correctly indicating the decreased amount of tear secretion. Lacrimal stability of tear is also disrupted; this can be evaluated by evaluation of the time taken for disruption of the lacrimal film (tear break-up time). Primary Sjögren’s syndrome can have hypergammaglobulinemia and the presence of anti-Ro (SS-A) and anti-La (SS-B) antinuclear antibodies.

**Treatment**

The initial treatment for dry eye syndrome is preservative free artificial tears and lubricating ointment at night. If dosing is more than 4-6 drops/day of the total number of eye drops, non-preserved tear supplementation without benzalkonium chloride should used in the eye. Topical corticosteroids (prednisolone 0.5% and dexamethasone 0.1%) remain the mainstay to targeting the inflammatory component, but because of the risk of steroid-induced raised intraocular pressure or formation of cataract, steroid treatment should be started under the guidance of ophthalmologist. In severe cases apart of tear drops, punctal plugs or cautery along with autologous serum tears can be used. Topical cyclosporine (restasis) is being used as new treatment agent with a considerable increase.
in tear production in those who are refractory to lubricants treatment alone. Cyclosporines have anti-inflammatory properties which are main mechanism of action to enhance the tear production. Apart from above-mentioned treatment use of autologous serum tears was reported to be beneficial in patients. Patients with severe disease may benefit from the systemic therapy of oral cyclosporine.

Apart from routine treatment, it is essential to avoid cigarette smoke, periocular cosmetics and low humidity atmospheres, aeroplanes, and windy locations. Furthermore, there are medications which can lead to dryness should searched from patients currently ongoing treatment such as antihistamines and antidepressants. Occupational habits which increase the tear film instability like prolonged reading or computer work should be avoided or reduced. Use of cool mist humidifier, moisture chamber glasses is useful. Dietary supplement of omega-3 fatty acids (eicosapentaenoic acid) or linoleic acid and gamma-linolenic acid has been shown to have benefits.

Meibomian gland disease should be treated with warm expression, lid hygiene, oral low-dose tetracyclines and topical lubricant, and inflammatory therapy. Effective lid margin hygiene can be advised with warm compresses for up to 30 min twice daily; it helps by enhancing the fluidity of the stagnant oils in the glands easing expression when the lids are massaged. Salivary gland autotransplantation is used only in cases with severe clinical states where the mouth is not excessively dry.

**Retinal vasculitis**

Retinal vascular inflammation can be seen with RA. It is a potentially blinding condition. It presents as a painless condition or patients may be completely asymptomatic or present with decreased visual acuity, floaters, scotomas, abnormal color vision, and metamorphopsia.

In active disease, there are exudates around retinal vessels leading to white sheathing or cuffing of the affected vessels. However, many patients may not show such fundal changes, so in such cases, fundus fluorescein angiography can be helpful for detecting retinal edema, exudation, and macular edema. In severe retinal vasculitis need the use of corticosteroids or immunomodulatory therapy.

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