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Contents

ORIGINAL ARTICLES

- Comparison between 0.5 µg/kg Dexmedetomidine with 0.5% Lignocaine and 0.5% Lignocaine Alone in Intravenous Regional Anesthesia for Forearm Surgeries: A Randomized Controlled Study
M Balamurugan, M Shanmugasundaram, R Kavitha 1
- Effectiveness and Complication of Subconjunctival Application of Mitomycin C in Pterygium Surgery: A Prospective Study
Sudhir Kumar, Ravi Ranjan, Sriti Sinha 6
- Spectrum of Severe Head Injury with Management and Outcome: A Single Tertiary Care Centre Study
Ratre Shailendra, Choudhary Sushma 9
- Correlation between Quantitative Insulin Sensitivity Check Index, Homeostatic Model Assessment and Body Mass Index
Pitta Paramjyothi, Dodda Surekha, A N R Lakshmi 13
- Effect of Butorphanol as an Adjuvant in Epidural Analgesia for Inguinal Hernia Surgery
S Yogeshwaran, S Balasubramanian, K Sanmugapiriya, Suneeth P Lazarus, S S S Kartheek Hajeebu, A Arulmani 17
- Prevalence of Trichomoniasis in Women Attending a Sexually Transmitted Disease Clinic in Mumbai
Sheela Sugathan 21
- Obesity and Salivary Parameters (Flow Rate, Buffer Capacity, and Salivary pH) in Children of Moradabad, India
Tasneem S Ain, Saima Sultan, Owais Gowhar, T L Ravishankar, Sumit Kumar 25
- Histopathological Study of Malignant Oral Tumours: A Five-Year Study
Smita S Masamatti, Alka V Gosavi 30

Hip Pathology Findings on Magnetic Resonance Imaging: A Study from Tertiary Care Institute <i>Purva Tripathi, Sonika Singh, Nitin Khantal</i>	35
Identification of Leptospira using Arbitrarily Primed Polymerase Chain Reaction <i>Sheela Sugathan</i>	39
Screening of Pediatric Urinary Tract Infection using Modified Nitrite Test <i>K M Senthilkumar, C Chandrasekaran, Heber Anandan, Nandhini Balaji, K V Sivakumar</i>	42
Prevalence of Perceived Myths Regarding Oral Health and Oral Cancer-causing Habits in Kashmir, India <i>Tasneem S Ain, Owais Gowhar, Saima Sultan</i>	45
Comparative Analysis of Results of Primary Bipolar Arthroplasty versus Proximal Femoral Nail Antirotation: A Prospective Study <i>Prasanta Kumar Saha</i>	50
Pathological Profile of Exudative Pleural Effusion using Pleural Biopsy by Abram's Needle: A Hospital-based Observational Study <i>K Surendar Reddy, J Sowmya, V Chetan Rao, Pradyut Waghray</i>	56
Antibiogram of Isolates from Cubital Fossa and Web Spaces of Hands of Hospitalized Patients <i>Mannur Sharada, K R Madhuri, Shravya</i>	60
Pattern of Oral Cavity Lesion: A Retrospective Study of 350 Cases <i>Shashikala Kosam, Pratima Kujur</i>	65
Diagnostic Accuracy of Magnetic Resonance Imaging in Characterizing Intracranial Space Occupying Lesions: A Cross-sectional Study <i>Raj Kumar, Alex Daniel Prabhu Arul Pitchai, Srinivasa Mudali</i>	70
Knowledge, Early Signs and Symptoms, Risk Factors and Prevention of Cervical Cancer among Teachers in the Urban Schools in Al-Ahsa, Kingdom of Saudi Arabia <i>Abdulaziz S Aldhafar, Abdulhmeed A Alhulaybi, Talha M Khan</i>	73

Serum Lipid Status in Subclinical Hypothyroidism <i>Indu Prasad, Uday Kumar, Anand Saran, Rekha Kumari, Jiut Ram Keshari, Bandana Kumari</i>	77
Morphological Spectrum of Liposarcoma of Extremities: A Series of 13 Cases from A Tertiary Care Centre of North-East India <i>Muktanjalee Deka, Chandan Jyoti Saikia, Susmita Sarma</i>	82
Prevalence of Metallo-beta-lactamase Production in Imipenem-resistant <i>Pseudomonas</i> in Tertiary Care Center at Kota Region <i>Anita E Chand, Pradhuman Singh Chauhan, Saurabh Sharma, Danish Afridi</i>	87
Comparative Study of Effects of Sevoflurane versus Propofol-based Anesthesia on Intraoperative Maintenance of Hemodynamics and Recovery Characteristics in Patients Undergoing Modified Radical Mastectomy <i>Chaudhary Kriti, Verma Indu, Vyas C K, Gowda Nischitha</i>	92
Study to Establish the Clinical Correlation between Chemical Constituents of Gallstones and Serum Biochemical Parameters <i>Priyesh Halgaonkar, Radha Verma, Rohini Bhadre, Pooja Unadkat, Chirag Vaja, Prashin Unadkat</i>	97
Bacterial Etiology and their Antibigram in Aerobic Vaginitis Patients at Tertiary Care Hospital, Kota, Rajasthan <i>Deepmala Nahar, Ghanshayam Soni, Anita E Chand, Suchitra Mourya</i>	103
Retrospective Study to Find Reliability of A-scan Biometry in Tertiary Care Center <i>S Ganapathy Rajesh, K Kavitha, N Sharmila, C Suriya Kumar</i>	108
Clinical, Biochemical, and Hematological Pointers toward Dengue Infection in Patients with Acute Undifferentiated Fever <i>G M Prakash, G V Anikethana</i>	111
Comparative Evaluation of Push-out Bond Strength of Novel Smart Seal System with Resilon/Epiphany and Gutta-percha/Ah-plus Obturating System: An <i>in vitro</i> Study <i>K Nanda Kumar, M Pratap Kumar, P Samba Sihva Rao, V Pallavi, Sohel Ahmed</i>	114

- Comparison of Small Incision Trabeculectomy (Minitrab-clear Corneal) with Conventional Trabeculectomy in Primary Open Angle Glaucoma
K Kavitha, N Sharmila, S Ganapathy Rajesh, C Suriya Kumar 118
- Left Internal Mammary Artery Versus Reversed Saphenous Vein Graft as Conduit to Left Anterior Descending Artery in South Indian Patients with Coronary Artery Disease Undergoing Coronary Artery Bypass Surgery
J Ravi Krishnan, J Suresh Patel, Nibi Hassan 121
- Clinical Analysis of Lethality in Perforated Peptic Ulcer
Bapurapu Raja Ram, Rapaka Ashok Reddy, Nagidi Prashanth Reddy 127
- Intraoperative Lavage in Peritonitis: Comparison between Saline and Metronidazole
Harpreet Singh, Malika Agrawal, Naveen Kumar Singh, Roop Kishan Kaul, Ikram Ilahi, Rakshit Ahuja 131
- Awareness of Diabetic Retinopathy in Rural Population in South Tamil Nadu
N Sharmila, K Kavitha, S Ganapathy Rajesh, C Suriya Kumar 135
- Morphology and Morphometry of Mental Foramen in Dry Adult South Indian Mandibles: A Cross-Sectional Study
B Lalitha, Ephraim Vikram Rao 140
- Role of Electrodiagnostic Nerve Conduction Studies in the Early Diagnosis of Diabetic Neuropathy: A Case-Control Study
B M K Aruna, R Haragopal 143
- Role of Ultrasonography and Color Doppler to Diagnosis of Pelvic Masses and its Correlation with Histopathological Findings
Kamlesh Prasad Gupta, Sandeep Kumar Jain 147
- Ultrasonographic Fetal Biometry in the Third Trimester in South Indian Population
B Lalitha, K Ephraim Vikram Rao 154
- Clinical Profile, Management and Treatment Outcome in Urethral Stricture Disease in Male Patients at a Tertiary Care Center
S Joseph, Rajpal Singh Lamba, Nitin S Joshi, Parth M Nathwani, Nandan Pujari 157

Assessment of the Relevance of Interval Appendicectomy in Treatment of Appendicular Lump: A Prospective Study <i>Sanjeev Kumar Chowdhary, Ramendranath Talukdar, Naveen Kumar Singh</i>	163
Serum Magnesium in Patients with Acute Myocardial Infarction <i>Lakshman Lal, Hiralal Murmu</i>	167
Effects of Tobacco Chewing on Cardiovascular Autonomic Function <i>R Haragopal, B M K Aruna</i>	170
Reproductive Factors and Risk of Breast Cancer among Patients Attending the Tertiary Care Hospital in North Bihar <i>Nishant Kumar, Kumari Monika</i>	174
Incidence and Clinical Profile of Leprosy in a Tertiary Care Hospital: A Retrospective Study <i>Revathy Mathan, K Maha Devan</i>	178
Mortality Profile of Burn Cases: A Retrospective Study <i>Mehreen Latif, Wasim Rashid, Shaheera Ajaz, Adil Majeed Mir, Saquib Zaffar Banday, Aamir Rashid</i>	180
Evaluation of Cardiovascular Autonomic Functions in Migraine Individuals <i>Ratna Manjushree Jayaraman, T N Vijayalakshmi, R Thenmozhi, Heber Anandan</i>	183
Clinical Spectrum and Epidemiological Profile of Patients Admitted to Pediatric Intensive Care Unit at a Tertiary Care Centre in South India <i>Sujay Kumar Earan, Lakshminarayanan Dhandapani, Arulkumaran Arunagirinathan, Shilpa Kantamneni</i>	187
Metastatic Lymphadenopathy by Fine-needle Aspiration Cytology <i>Urmi Shailesh Chakravarty-Vartak, Shailesh S Vartak, Prachi B Nichat</i>	192
Laryngeal Biopsies with Special Reference to Malignant Tumors: A Histopathological Study <i>K P Varalakshmi, V Sivashankar Naik, R Sujeeva Swapna, P Sravani, M Neeraja</i>	197

Magnetic Resonance Imaging Susceptibility-weighted Imaging is More Reliable to Detect Hemorrhage and Calcification than Magnetic Resonance Imaging T2*-weighted Gradient Echo in Brain Imaging <i>B Ashraf Ahmed, N Arun Kumar, Deepeesh Vijayan, Abubacker Sulaiman Farook, Praveen Kumar Magudeeswaran, Preethi Ganesan</i>	203
Distal Motor (M) Latency, F-wave Latency, and M/F Ratio in the Diagnosis of Diabetic Neuropathy <i>B M K Aruna, R Haragopal</i>	206
Utility of Three-dimensional Multiple Planar Volume Reconstruction and Transparency Lung Volume Rendering as a Stand-alone Imaging Technique for Diagnosis and Pre-operative Evaluation of Tracheo-esophageal Fistula <i>Sudha Kiran Das, Kamal Kumar Sen, M D Ravi, Vikram Patil, Samresh Patel</i>	209
Clinical Study of Alvarado Scoring in Acute Appendicitis <i>Araboina Upender, Goparaju Shanti Kumar, Dodda Ramesh Kumar</i>	214
REVIEW ARTICLE	
Gingival Biotype and Gingival Bioform: Determining Factors for Periodontal Disease Progression and Treatment Outcome <i>Neha Joshi, Manvi Chandra Agarwal, Ellora Madan, Shubhangi Gupta, Aditya Law</i>	218
CASE REPORTS	
Acute Subthalamic Stroke Presenting as Hemiballismus: A Review of Literature <i>Vaibhav Ingle, R Gupta</i>	224
Thrombus in Right Side of Heart Mimicking Myxoma: An Autopsy Case Report <i>Chandrakala Joshi, Vanita Bhaskar, Pratima Kujur, Ekta Gidwani, Madhubala Mulkalwar</i>	226
Management of Complex Root Canal Curvature of Bilateral Radix Entomolaris: Three-dimensional Analysis with Spiral Computed Tomography <i>Aditi Jain, Pragya Jaiswal, Yogesh Sahu, Abhinav Singhal, Vaibhav Sharma</i>	229
Atrial Septal Defect Presenting in a 70-Year-Old Woman: A Rare Case Report <i>Pooja Shashidharan</i>	233

Comparison between 0.5 µg/kg Dexmedetomidine with 0.5% Lignocaine and 0.5% Lignocaine Alone in Intravenous Regional Anesthesia for Forearm Surgeries: A Randomized Controlled Study

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Abstract

Background: Intravenous regional anesthesia (IVRA) has been used for more than a century. We designed this study to find out the efficacy of 0.5 µg/kg dexmedetomidine when added with 0.5% lignocaine in IVRA.

Materials and Methods: A total of 60 patients were randomly assigned into two groups. Group D ($n = 30$) patients received 40 ml of 0.5% lidocaine with 0.5 µg/kg dexmedetomidine and Group L ($n = 30$) patients received 40 ml of 0.5% lidocaine alone. Times of onset and recovery of sensory and motor blocks, tourniquet pain using visual analog scale (VAS) score, intraoperative sedation score using Ramsay sedation score and post-operative analgesia were recorded.

Results: Demographic details were comparable, and there was no difference in duration of the surgery between both groups. Significantly shorter onset times and longer recovery times of sensory and motor block were recorded in Groups D compared to Group L. Delayed onset of tourniquet pain occurred in Groups D compared to Group L. About 21 patients required fentanyl to control tourniquet pain in Group L while no patients required supplementation in Groups D. Significantly lower post-operative VAS score, longer time to first dose analgesia were recorded in Groups D.

Conclusion: The addition of 0.5 µg/kg dexmedetomidine to lignocaine for IVRA reduced the time for onset of block, delayed the onset of tourniquet pain, improves quality of anesthesia prolonged post-operative analgesia and reduced post-operative analgesic requirement.

Key words: Bier's block, Dexmedetomidine, Intravenous regional anesthesia, Lignocaine

INTRODUCTION

Intravenous regional anesthesia (IVRA) first described by August Bier in 1902 is simple, reliable with high success rate. It was revived in 1963 by Holmes,¹ who used lignocaine because it appeared to give more reliable anesthesia than procaine.² Today IVRA with slight technical modifications is an ideal method of providing anesthesia for minor

surgical procedures to the extremities performed on an ambulatory basis.³ It has the advantages of speed of onset, rapid recovery, reliability of blockade and cost effectiveness. An adjuvant to local anesthetics has greatly expanded the potential applications of regional anesthesia by providing faster onset time, inhibition of tourniquet pain, prolonged post-operative analgesia, and improved quality of anesthesia.⁴ Dexmedetomidine, a α_2 adrenoceptor agonist has been shown to decrease anesthetic requirements and improve quality of anesthesia.⁵

We designed this study to evaluate the efficacy of 0.5 µg/kg dexmedetomidine when added to 0.5% lignocaine in IVRA. We compared the onset and duration of sensory and motor blockade, onset of tourniquet pain, intraoperative sedation score, and post-operative analgesia

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during IVRA using lignocaine alone and lignocaine with dexmedetomidine.

MATERIALS AND METHODS

This randomized controlled study was conducted after obtaining Institute Ethical Committee approval. 60 patients of the American Society of Anesthesiologists (ASA) Grades I and II age between 20 and 60 years who came for upper limb surgeries lasting for <90 min were included in this study. A written informed consent was obtained from all patients. The detailed preanesthetic check-up was done on all patients and relevant hematological, biochemical, and radiological investigations were carried out for all patients as per surgical requirements. The study populations were classified into two groups. Group D patients received 40 ml of 0.5% lignocaine with 0.5 µg/kg dexmedetomidine and Group L patients received 40 ml of 0.5% lignocaine. The patients with a history of allergy to local anesthetics, sickle cell disease, Raynaud's disease, scleroderma, local infection, Paget's disease, patients with inadequate starvation <6 h, and patients who had a contraindication to dexmedetomidine were excluded from this study.

All patients were premedicated with injection midazolam 0.15 mg/kg, intramuscularly 45 min before surgery. In the operating room, appropriate equipment for the airway management and emergency drugs were kept ready. Non-invasive blood pressure monitor, pulse oximeter, and electrocardiogram leads were connected to the patient. Pre-operative baseline hemodynamic variables were recorded. An IV line was secured in non-operative limb and started with dextrose normal saline.

A 22 G cannula was placed intravenously as distal as possible in the arm to be anesthetized. The arm was exsanguinated using Esmarch bandage. If this was impossible, exsanguinations were achieved by elevating the arm for 2-3 min while compressing the axillary artery. The double tourniquet was applied on the arm with generous layers of padding, ensuring that no wrinkles are formed, and the tourniquet edges do not touch the skin. The proximal tourniquet was inflated to at least 100 mm Hg higher than the patient's systolic blood pressure. Before injecting local anesthetic, radial pulse was palpated and confirmed that there was no pulse. A standard volume of 40 ml of 0.5% lignocaine (Group L) or 40 ml of 0.4% lignocaine with 0.5 µg/kg dexmedetomidine (Group D) was injected over 90 s by an anesthesiologist who was blinded to the drug being administered. The sensory block was assessed by pinprick performed with 22 gauge needle. Sensory block onset time was defined as the time taken

from injection of study drug to sensory block achieved in all dermatomes. Motor block was assessed by asking the patient to flex and extend of the wrist and fingers. The onset of motor blockade was defined as the time taken from injection of the study drug to complete motor block. After achieving surgical anesthesia, the distal tourniquet which overlies part of the anesthetized arm was inflated and the proximal one was deflated. After that, the surgeons were allowed to proceed.

Intraoperatively, pulse rate, blood pressure, respiratory rate, SPO₂, and signs of drug toxicity were monitored regularly. Assessment of tourniquet pain scores was made on the basis of the visual analog scale (VAS) (0 = "no pain" and 10 = "worst pain imaginable") and degree of sedation using Ramsay sedation score⁶ (scale 1-5, 1 = completely awake, 2 = awake but drowsy, 3 = asleep but responsive to verbal commands, 4 = asleep but responsive to tactile stimulus, and 5 = asleep and not responsive to any stimulus) measured before and after tourniquet application, 5, 10, 15, 20, and 40 min after the injection of anesthetic. Intraoperatively, boluses of 1 µg/kg fentanyl were provided for tourniquet pain treatment when required (when VAS was >3), and intercostobrachial nerve block with a local infiltration around the cuff.

The cuff was not deflated until 30 min after local anesthesia injection even if surgery was completed before 30 min and not inflated more than 90 min. The cuff deflation was performed in cyclic deflation technique. Sensory recovery time was defined as the time elapsed after tourniquet deflation up to recovery of pain in all dermatomes determined by pinprick test. Motor block recovery time was noted. Post-operative pain was assessed by VAS score. The patients received injection diclofenac 75 mg intramuscular when VAS score ≥3. The duration of analgesia was defined as the time from tourniquet deflation to the first injection of diclofenac.

Data analysis was performed with the help of computer using epidemiological information package (EPI 2010) developed by Centre for Disease Control, Atlanta. Using this software range, frequencies, percentages, means, standard deviations, Chi-square, and "P" values were calculated. Kruskal-Wallis Chi-square test was used to test the statistically significant difference between quantitative variables and Yate's Chi-square test for qualitative variables. A *P* < 0.05 is taken to denote significant relationship.

OBSERVATION AND RESULTS

A total of 60 patients were enrolled in the study. The flow of participants is depicted by the CONSORT flow

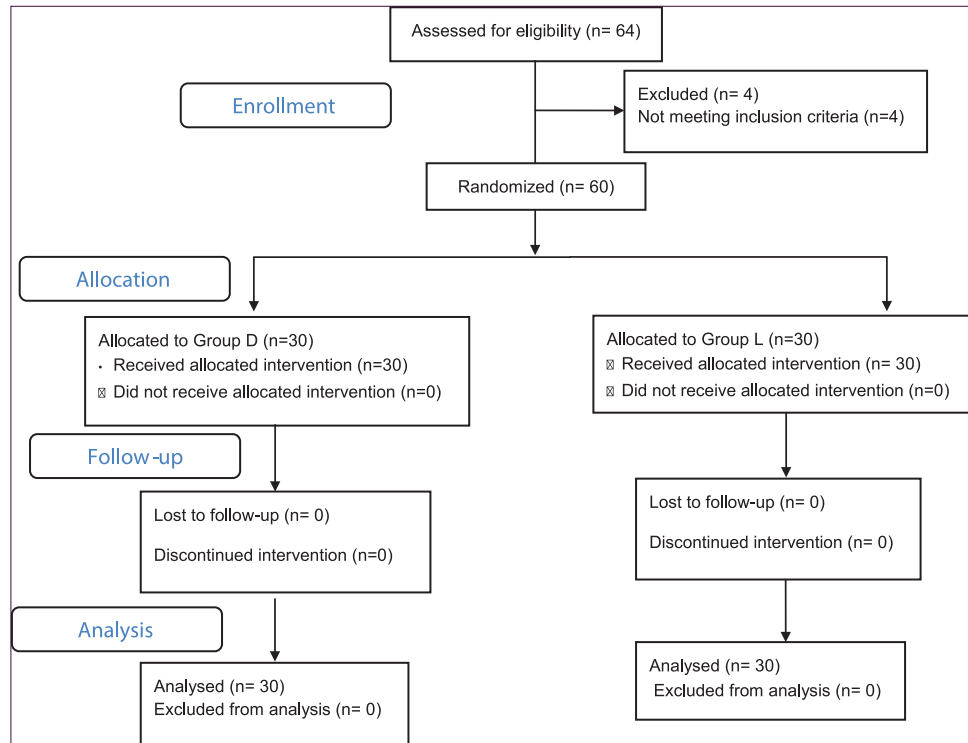


Figure 1: The CONSORT diagram showing flow of participants in each stage of the dexmedetomidine with lignocaine in intravenous regional anesthesia

diagram (Figure 1). The demographic profiles of two groups were comparable in terms of age, sex distribution, weight, and ASA physical status. The mean duration of surgery is not statistically significant between both groups.

The sensory onset time was shorter in Group D when compared to Group L which was 1.8 ± 0.76 min in Group D and 5.27 ± 0.58 min in Group L and it is found to be statistically significant ($P = 0.0001$) (Table 1). The time of onset of motor block was shorter in Group D when compared to Group L which was 13.63 ± 1.54 min in Group D and 18.07 ± 1.26 min in Group L and it is found to be statistically significant ($P = 0.0001$) (Table 2). 21 cases in Group L required rescue analgesia, whereas none of the patients in Group D required it. This was statistically significant ($P = 0.0001$) (Table 3). The sensory recovery time in Group D was longer (18.87 ± 3.27 min) when compared to Group L (4.8 ± 0.71 min) and it was found to be statistically significant. ($P = 0.0001$). The motor recovery time in Group D was longer (25.6 ± 3.83 min) when compared to Group L (2.53 ± 0.51 min) and it was found to be statistically significant. ($P = 0.0001$). VAS reached a score of 3 at 416.2 ± 45.73 min in Group D and at 11.33 ± 0.96 min in Group L and it was found to be statistically significant. ($P = 0.0001$).

Table 1: Patient characteristics and duration of surgery (mean±SD [range])

Characteristics	Group D (n=30)	Group L (n=30)	P*
Age (year)	37.8±8.7 (23-53)	36.8±10.8 (20-56)	0.6148
Weight (kg)	52.5±5.0	52.9±5.5	0.8471
Gender (M/F)	17/13	19/11	0.7921
ASA I/II	24/6	23/7	0.4251
Duration of surgery (min)	46.83±5.07 (40-56)	47.43±4.79 (40-55)	0.6354

* $P \leq 0.05$ is significant, ASA: American Society of Anesthesiologists

Table 2: Characteristics of sensory and motor block (mean±SD [range])

Characteristics	Group D	Group L	P*
Onset of sensory block (min)	1.8±0.78 (1-3)	5.27±0.58 (4-6)	0.0001
Sensory block recovery time (min)	18.87±3.27 (10-22)	4.8±0.71 (3-6)	0.0001
Onset of motor block (min)	13.63±1.54 (10-15)	18.07±1.26 (16-20)	0.0001
Motor block recovery time (min)	25±3.83 (15-35)	2.53±0.51(2-3)	0.0001

* $P \leq 0.05$ is significant. SD: Standard deviation

In our study, there was no significant difference in pulse rate between both groups, and there is no significant difference in blood pressure. The oxygen saturation monitored throughout the study, and there was no significant difference between the groups.

Table 3: Rescue analgesia, post-operative analgesia and sedation score (mean±SD [range])

Variables	Group D	Group L	P*
Rescue analgesia Yes/No	0/30	21/9	0.0001
Duration of post-operative analgesia (min)	416.2±45.73 (280-490)	11.33±0.96 (10-13)	0.0001
Sedation score	1.77±0.43 (1-2)	0	0.0001

*P≤0.05 is significant. SD: Standard deviation

DISCUSSION

IVRA uses local anesthetics administered to one particular limb by occluding the arm proximally to provide conduction blockade. IVRA has many advantages. It is simple, reliable with rapid onset and recovery. Despite these advantages, IVRA has its own limitations like lack of post-operative analgesia and tourniquet pain which causes discomfort to the patient. In this study, we attempted to eliminate these advantages by adding dexmedetomidine as an adjuvant. The pharmacological properties of dexmedetomidine include sedation, analgesia, anxiolysis, perioperative sympatholysis, cardiovascular stability, reduced anesthetic requirements, and preservation of respiratory function have been extensively studied and clinically employed in regional anesthesia. Dexmedetomidine is 8-10 times more selective toward α_2 adrenergic receptors and is 3.5 times more lipophilic than clonidine. It thus prolongs the duration of both sensory and motor blockade induced by local anesthetics, irrespective of the route of administration.

Kol *et al.*⁷ compared addition of 0.5 µg/kg dexmedetomidine or lornoxicam with 0.5% lignocaine in IVRA and they conclude that shortened sensory onset time and prolonged sensory recovery time in dexmedetomidine group. These results were correlated with our finding where the sensory onset time was shortened by about 4 min and sensory recovery time was prolonged about 14 min in dexmedetomidine group. Esmaglu *et al.*⁸ in their study concluded that addition of dexmedetomidine with lignocaine shortened the motor block onset time and prolonged the motor block recovery time. This finding was comparable with our study in which the motor block onset time was about 4 min shorter and motor block recovery time was about 23 min longer in dexmedetomidine group. This could be attributed to more selective action of dexmedetomidine on α_2 adrenergic receptors and its lipophilic nature.

Tourniquet pain and lack of post-operative analgesia are major drawbacks of IVRA. In a study conducted by Memis *et al.*⁹ showed that incidence of tourniquet pain was less when dexmedetomidine added to lignocaine in

IVRA. This result was comparable in our study in which no patients had tourniquet pain in dexmedetomidine group, whereas 70% of patients had tourniquet pain in lignocaine group. The mechanism of tourniquet pain remains unclear despite the role of A fibers and unmyelinated C fiber. Dexmedetomidine depresses nerve action potentials, especially in C fibers, by a mechanism independent of the stimulation of α_2 adrenergic receptors.^{10,11} This mechanism accounts for strengthening of the local anesthetic block achieved by perineural administration of the drug and could be implicated in the effect seen in our study.

In this study, we recorded the time for demand of rescue analgesic as a measure of post-operative analgesia. The duration of post-operative analgesia was significantly higher with dexmedetomidine group which was about 400 min longer than lignocaine group. This prolonged duration of analgesia attributed to α_2 adrenergic receptors located at nerve endings may have a role in the analgesic effect of the drugs by preventing norepinephrine release.

CONCLUSION

The addition of 0.5 µg/kg dexmedetomidine to lignocaine in IVRA shortens sensory and motor block onset time and prolongs sensory and motor recovery time. Dexmedetomidine decreases the pain associated with inflation of tourniquet. Dexmedetomidine improves the quality of anesthesia and prolongs post-operative analgesia.

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Effectiveness and Complication of Subconjunctival Application of Mitomycin C in Pterygium Surgery: A Prospective Study

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Abstract

Introduction: Pterygium excision surgery poses distinct problem like high post-operative recurrence. Many surgical approaches have been tried to decrease recurrences. Currently, intraoperative Mitomycin C (MMC) application is used as adjunct apart from the standard limbal-conjunctival autograft.

Purpose: To study the efficiency and MMC related complications when MMC was applied on the under surface of the conjunctiva of dissected pterygium.

Materials and Methods: This is a non-comparing prospective interventional case series of 38 patients. The patients underwent standard pterygium excision with intraoperative MMC application on the under surface of dissected pterygium conjunctiva and followed for 1-year.

Result: Out of 38 patients no one had a recurrence of pterygium. Only one patient has post-operative increased corneal astigmatism ($P > 0.05$).

Conclusion: Intraoperative application of MMC in the strength of 0.2 mg/ml for 90 s is effective in preventing the recurrence of pterygium without any post-operative major complication.

Key words: Astigmatism, Conjunctiva, Mitomycin C, Recurrent pterygium, Streptomyces

INTRODUCTION

Pterygium is a common ocular disorder treated by surgical excision. It is more prevalent in the equatorial region. Ultraviolet B-ray is the most important environmental factor. P53 and human papilloma virus and deficiency of limbal stem cell may be other factors causing pterygium. They may cause gene mutation resulting in abnormal expression of the conjunctival epithelium.

One of the major problems with pterygium surgery is a high rate of recurrence. It ranges from 30% to

89%.^{1,2} Various methods have been developed to tackle this problem. Intraoperative or post-operative use of Mitomycin C (MMC) is one of the adjunctive treatments that can significantly reduce the rate of recurrence.^{3,4} MMC is an antibiotic isolated from *Streptomyces caespitosus*. It is an alkylating agent. Pathological changes in pterygium occur in conjunctival epithelium.²

The aim of this study was to evaluate efficacy and MMC related complications when MMC was applied on the under surface of conjunctiva of dissected pterygium.

MATERIALS AND METHODS

The study is a prospective non-comparative interventional case series. A total of 38 consecutive patients were included through the period of 3 years. Patients with dry eye, inflamed eye, and immune disorder were excluded. After taking, informed consent patients under went

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standard pterygium excision. Overlying conjunctiva was separated from underlying tissue and flesh of the pterygium was excised. Tip of the conjunctiva was sacrificed. Intraoperative MMC of 0.2 mg/ml strength for 90 s was applied on the under surface of dissected pterygium conjunctiva while protecting the sclera from MMC exposure by the use of spatula over the sclera during MMC application (Figure 1). Then, it was washed thoroughly. Freely mobile conjunctiva was anchored. The patients were followed up on 1st week, 4th week, 3rd month and after 1-year. Patients were looked for bleaching, thinning, dellens, ulceration, persistent epithelial defect, visual acuity, and recurrence. Recurrence was defined as fibrotic vascularization tissue crossing through the limbus.

RESULT

An average duration of surgery was 13 min. Pre-operative best-corrected vision was <6/60 in 22 patients and better than 6/36 in 16 patients. 26 patients had a cataract. Age ranged from 22 to 69 years. Male-female ratio was 3:1. No epithelial defect was present by the 7th day. No case of dellens, thinning, ulceration or ble-aching was seen. Visual acuity increased in all the patients after surgery with a decrease in astigmatism. Astigmatism increased in one eye of a patient who was operated for recurrence of pterygium in his both the eyes after 3 months.

DISCUSSION

The recurrence rate for bare sclera excision alone is unacceptably high, 30-80%.^{1,2} Singh *et al.* introduced the use of MMC as an adjunct to pterygium surgery to ophthalmology in 1988. Although MMC significantly reduced the rate of recurrence to a range of <10%, severe complications such as ocular surface disorder, corneal perforation, scleral calcification, corectopia, iritis, cataract, photophobia, pain and glaucoma were reported by Singh *et al.*^{3,5} These complications were mostly related to uncontrolled use of high and cumulative dose of MMC and its application over sclera.^{6,7} Despite the fact that early complications can be avoided and controlled, one cannot implicate the outcome of MMC application years after its use (remember beta radiation). The recurrence rate in conjunctival autograft varied from 2% to 39%¹ which is comparable to MMC use.⁸ Inter surgeon variation contributed to recurrence rate reported in conjunctival and amniotic membrane graft. We applied MMC on the under surface of conjunctiva while protecting the sclera from MMC exposure assuming that we should target proliferating subconjunctival tissue rather than innocent sclera. All the recurrences occur during the first 6 months

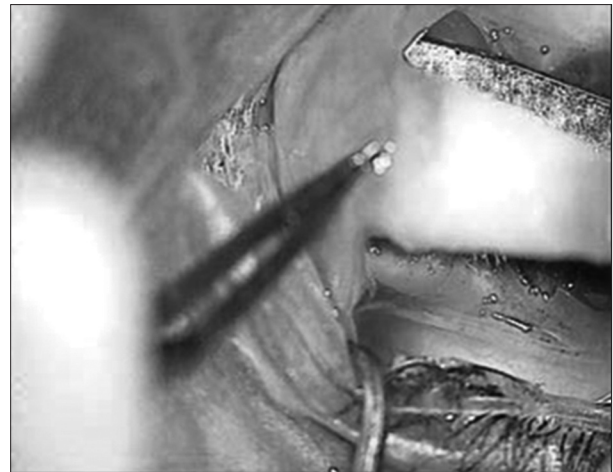


Figure 1: Method of application of Mitomycin C

of surgery when MMC is not applied.³ MMC is effective even if applied 0.2 mg/ml for 30 s.⁹ Based on this, we applied MMC in the strength of 0.2 mg/ml for 90 s.

In our study, no recurrence was seen during 36 months of follow-up. No complications related to MMC use were seen. Average surgical time was only 13 min in this study. Visual acuity increased in all cases following pterygium surgery due to decreased astigmatism. 26 patients underwent cataract surgery 4 weeks after pterygium surgery. There was an increase in astigmatism in one eye of case number one 2 weeks after pterygium excision, may be due to increase in fibrosis but remained stable in following visits. The technique is fast and simple, while conjunctival or amniotic membrane graft is not only time consuming but requires special skill.

CONCLUSION

Application of MMC in the strength of 0.2 mg/ml for 90 s is effective in preventing the recurrence and causes no harm to the vital parts of the eye.

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Spectrum of Severe Head Injury with Management and Outcome: A Single Tertiary Care Centre Study

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Abstract

Introduction: Head injury continues to be a challenge not only for the public but also for the neurosurgeon. India has the distinction of having the highest rate of head injury in the world.

Materials and Methods: This is a prospective observational study of severe head injury patients admitted to our hospital during the period August 2003 to June 2005. A total of 150 severe head injury patients of all age groups were admitted and treated. In all cases; age, sex, mechanism, severity, other associated injuries, computed tomography (CT) findings, management, and Glasgow outcome scale were analyzed.

Results: The incidence of severe head injury was maximum in the third decade (27.3%). Males were more commonly involved than females, M:F = 4:1. Road traffic accidents were the major cause of head injury (52.6%). Road traffic accidents and assaults were the main cause in adults while fall was the leading cause in children. 41.9% cases were admitted within 5 h of injury. 64% cases were referred from other hospitals, maximally from district hospitals. Alcohol intoxication was present in 18.6% cases. In 55% cases, associated injuries were recorded in the study with clavicle fracture as a most common fracture. Contusions were the most common intracranial lesions on CT imaging. Skull fractures were recorded in 26% cases with frontal bone as the most common site. Surgery was required in 33.3% patients and 20% required tracheostomy. Overall mortality was 40.7%. Poor prognostic factors which are recorded: Delay in admission, advanced age >60 years, CT findings: Brain edema, acute subdural hemorrhage, subarachnoid hemorrhage, dilated pupil, and Glasgow coma scale 3-5.

Conclusion: Outcome of head injury depends on initial presentation. Early recognition and prompt management contribute to decrease mortality and disability. CT scan facility in district hospitals; early referrals of head injury patients to higher centers and neurosurgical intensive care can decrease mortality in head injuries.

Key words: Computed tomography, Glasgow coma scale, Glasgow outcome scale, Head injury, Severe head injury

INTRODUCTION

Head injury continues to be a challenge not only for the public but also for the neurosurgeon. It is an important cause of high morbidity and mortality, particularly in young and productive age group patients. In spite of marked improvements in pre-hospital care, operative skills and overall management of head injuries, mortality/morbidity of severe head injury has not changed over the last 30 years

due to urbanization, industrialization, and increase in vehicular population.¹

Over 5.56 million accidents occur worldwide per year with 1.2 million deaths annually and 3400 death/day. India has the distinction of having the highest rate of head injury in the world. In 1990, 80,000 people were killed in road traffic accidents, which increased to 150,000 deaths per year in 2011. Pedestrians and motorcyclists are the most common victims of road traffic accidents in India. Traumatic brain injuries are a leading cause of morbidity, mortality, disability, and socio-economic losses in India and other developing countries.

Head injuries can be classified according to severity 80% as mild (Glasgow coma scale [GCS] 13-15), 10% moderate (GCS 9-12), the remainder are severe in nature (GCS 3-8).

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Severe head injury accounts for more than 50% of trauma-related deaths; these usually occur following road traffic accidents, assaults, and falls.

Assessment of the head injury patient begins with the advanced trauma life support protocol of ensuring patency of the airway with cervical spine control while maintaining good oxygenation and tissue perfusion.² This aims to prevent the development of secondary brain injury. Between 5% and 10% of head injuries have an associated cervical spine injury.³ Such an injury can be excluded in almost all cases with a combination of computed tomography (CT), magnetic resonance imaging, or flexion-extension radiography of the neck and should clinical suspicion indicate it. Once the clinician is satisfied that the patient is resuscitated with a stable cardiorespiratory status, neurological assessment can occur. The neurological examination begins with an assessment of patient's conscious level using the GCS. The severity of the head injury can be based on this initial GCS score. Pupil size and reaction to light are also assessed. Asymmetry of limb movement may help in diagnosing an underlying intracranial lesion. Observations on the blood pressure, pulse, and respiratory rate are also essential.

All patients with multiple injuries and those with severe head injuries should have blood samples analyzed for baseline estimations - full blood count, electrolytes and urea, coagulation screen, blood gases, alcohol level, and blood group.

Although the severe head injury is only a relatively small part of the head injury picture, mild, and moderate injuries combined are 5 times as common surgeons are more involved in the care of patients with severe head injuries where care is more complicated. Maximum mortality occurs in this severe group.

The present prospective observational study is designed to elucidate demographic profile, epidemiology, management, and outcome of severe head injury patients.

MATERIALS AND METHODS

This prospective observational study was carried out in the Department of General Surgery Maharaja Yaswant Hospital, Indore, Madhya Pradesh, India, from August 2003 to June 2005. All head injury patients were registered, and the study was carried out on severe head injury group patients after getting post-resuscitation GCS. Detailed history and careful clinical examination were performed on each patient. GCS was noted in each case. Laboratory investigations done were hemoglobin, total and differential

leukocyte counts, hematocrit, blood urea and serum creatinine, random blood sugar, and serum electrolytes, X-rays skull, chest, limbs, and spine (where indicated) were done. Plain CT head was done every case. Patients were managed into conservative and surgical groups. Outcome was measured at the time of discharge using Glasgow outcome scale.

RESULTS

A study regarding the epidemio-clinical and management aspects of 150 severe head injury cases in Maharaja Yeshwantrao Hospital, Indore, has been conducted from August 2003 to June 2005. Following were the results.

The incidence of severe head injury was maximum in the third decade (27.3%) (Table 1). Males were more commonly involved than females (Table 2), M:F = 4:1. Road traffic accidents were the major cause of head injury (52.6%). Road traffic accidents and assaults were the main cause in adults while fall was the leading cause in children (Table 3). 41.9% cases were admitted within 5 h of injury, and out of this,

Table 1: Age distribution (severe head injury)

Age group (years)	Number of cases (%)
Up to 10	29 (16.0)
11-20	20 (13.3)
21-30	41 (27.3)
31-40	35 (23.3)
41-50	15 (10.0)
51-60	5 (8.3)
Above 60	10 (6.6)
Total	150 (100)

Table 2: Sex distribution (severe head injury)

Age group (years)	Male	Female
Up to 10	29	16
11-20	18	2
21-30	37	4
31-40	33	4
41-50	13	2
51-60	4	1
Above 60	4	6
Total	118	32

Table 3: Causes of severe head injury

Mode of injury	Number of cases (%)
Road traffic accidents	79 (52.6)
Fall from height	31 (20.6)
Assaults	26 (17.3)
Falling objects	3 (2.0)
Miscellaneous	11 (7.3)
Total	150

22.6% were brought within 24 h. 12.6% were brought after 24 h (Table 4). Alcohol intoxication was present in 18.6% cases. In 55% cases, associated injuries were recorded with clavicle fracture as most common associated injury. CT scanning of the head was done in all patients with contusions (50%) as most common intracranial lesions. Other findings were fractures, extradural hematoma, subdural hematoma, subarachnoid bleed, brain edema, diffuse axonal injury, and intraventricular bleed (Table 5). Skull fractures were recorded in 26% cases with frontal bone as the most common site. 33.3% cases undergone surgical intervention (Table 6) and 20% cases required tracheostomy. Overall mortality was 40.7%, good recovery occurred in 48%, moderate disability in 3.3%, severe disability in 5.3%, and persistent vegetative state was observed in 2.7% patients (Table 7). Poor prognostic factors, which are recorded in this study: Delay in admission, advanced age >60 years, CT findings: Brain edema, acute subdural hemorrhage (SDH), subarachnoid hemorrhage (SAH), pupillary changes, and GCS 3-5.

DISCUSSION

In severe head injury group, the highest incidence (27.3%) was found in the third decade followed by 23.3% in the

Table 4: Time interval between injury and admission

Time interval (h)	Number of cases (%)
Within 2	34 (23.6)
2-5	29 (19.3)
5-8	16 (10.6)
8-11	15 (10.0)
11-18	13 (8.6)
18-24	16 (10.6)
Above 24	19 (12.6)
Not known	8 (5.3)
Total	150

Table 5: Lesion on CT scan in GCS 3-8 (150 cases)

Lesions	Number of cases
Extradural hematoma	40
Subdural hematoma	30
Contusions	75
Frontal	40
Temporal	13
Parietal	10
Occipital	2
Multiple	10
Brain stem lesions	2
Intraventricular blood	8
Subarachnoid bleed	30
Infarcts	5
Brain edema	20
Diffuse axonal injury	20
Pneumocephalus	15
Fractures	70
Subdural effusions	5

CT: Computed tomography, GCS: Glasgow coma scale

fourth decade which is similar various studies,^{4,7} in which the highest incidence of severe head injuries reported in the third decade. Incidence in males (79%) is higher than females (21%). Road traffic accident was the leading cause of severe head injury accounting for 52.6% of patients. It was followed by fall with the incidence of 20.6% and assault with incidence of 17.3% which is in unison with other similar studies.^{5,8,9} In the present study, 42% cases were brought to the hospital within 5 h of injury, and out of this, 22.6% were brought within 24 h. 12.6% were brought after 24 h. Our percentage of patient's referral within 6 h of injury is lower than studies from developed countries.^{9,10} This stresses the need of good transportation facility from primary health centers and district hospitals to tertiary centers in India. Compared to the study of Jennett *et al.*, alcohol positivity (38.3%) is lower in the present study (19%). 83 cases (55%) have associated injury, which is higher from similar studies.^{9,11}

The higher incidence of associated injuries is attributed to maximum cases of soft tissue injuries in present series. Contusion was the most common finding on CT imaging 75 cases (50%) showed contusions; frontal lobe is the most common site. Other findings were fractures, extradural hematoma, subdural hematoma, subarachnoid bleed, brain edema, diffuse axonal injury, and intraventricular bleed. Findings of present series are more or less similar to CT findings of Selladurai *et al.*¹⁰ Contusion is the most common finding in both the studies.

Surgical intervention was required in 50 patients (33.3%), out of which, 9 cases died postoperatively. The remaining cases of severe head injury were managed conservatively with proper chest physiotherapy, tracheostomy (where prolonged intubation required), ventilatory support, RT feeding, and nursing care. Tracheostomy was required in 30 patients. Percentage of surgical management varies from

Table 6: Management in severe head injury

Authors	Cases	Non-surgical (%)	Surgical (%)
Jennett <i>et al.</i> (1977)	531	72	28
Saul and Ducker (1982)	106	69	31
Levati <i>et al.</i> (1982)	215	46.5	53.5
Lobato <i>et al.</i> (2005)	56	86	14
Present series	150	66.7	33.3

Table 7: Outcome in severe head injury cases

Outcome	Number of cases (%)
Death	61 (40.7)
Persistent vegetative state	4 (2.7)
Severe disability	8 (5.3)
Moderate disability	5 (3.3)
Good recovery	72 (48.0)
Total	150 (100)

Table 8: Outcome according to GOS in severe head injuries

Authors	Cases	GOS				
		Recovery	Moderate disability	Severe disability	Vegetative state	Death
Jennett <i>et al.</i> (1977)	700	22	15.8	8.8	2	51
Levati <i>et al.</i> (1982)	215	35.8	10.7	4.2	1	39.5
Selladurai <i>et al.</i> (1992)	109	26.6	11	14.7	7.3	40.4
Present series (11 cases not specified)	150	48	3.3	5.3	2.7	40.7

GOS: Glasgow outcome scale

study to study^{6,9,12} (Table 6). This may be due to the type of head lesions in different patients varies from study to study.

Overall mortality was 40.7%, recovery 48%, and severe disability 5.3%. These results are comparable to the study of Levati *et al.*¹³ In the present study, the outcome was evaluated according to the state of the patient at the time of discharge. Other studies^{9,10} drawn results from serial follow-up (Table 8). This is the reason for the variation in results of the outcome.

The factors related with bad prognosis were delayed (>1 day) interval between injury and admission, patients with GCS 3-5, age >60 years, CT findings: Brain edema, acute SDH, SAH, and dilated pupil. Chaudhury *et al.*,¹⁴ in 472 cases of severe head injuries, found GCS<8, advanced age, dilated pupil, extensor rigidity, and altered blood pressure as risk factors with bad prognosis.

CONCLUSION

Tremendous increase in number of head injury, the management of head injury has gained an important place today. Most effective way to decrease the burden is to do prevention. Enforcing traffic rules, wearing helmet while driving, laws against alcoholism can decrease head injury. The outcome of head injury is drastically correlated to the quality of pre-hospital care and the rapidity with which they are transferred to a specialized center, where they can be managed promptly and effectively. Development of strong transportation system and initial care at primary health centers and district hospitals in India can decrease morbidity and mortality. Finally, dedicated trauma units should be established to give comprehensive care to head injury victims.

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Correlation between Quantitative Insulin Sensitivity Check Index, Homeostatic Model Assessment and Body Mass Index

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Abstract

Introduction: Normal insulin sensitivity varies widely and is influenced by age, ethnicity and obesity. The hyperinsulinemic-euglycemic clamp technique is the most scientifically sound technique for measuring insulin sensitivity and it is against this standard that all other tests are usually compared. Insulin resistance is part of a metabolic syndrome that affects multiple systems and whose key pathogenic element is hyperinsulinemia. Insulin resistance is compounded by a common occurrence of obesity although insulin resistance is also present in non-obese women.

Purpose: Weight gain is the more important as it is associated with increased risk of coronary artery disease, endometrial cancer, polycystic ovarian disease, hypertension, and diabetes mellitus.

Materials and Methods: A total of 50 healthy women in reproductive age group of 18-34 years selected as subjects and divided into two groups based on body mass index (BMI) normal range additional cut-off points as 18.5-22.9 (Group I) and 23-24.99 (Group II). Quantitative insulin sensitivity check index and homeostatic model assessment were calculated based on fasting blood sugar and fasting insulin of the subjects in both groups.

Results: There is a significant increase with $P < 0.0001$ in fasting insulin levels with a decrease in insulin sensitivity and increase in insulin resistance as the BMI increases.

Conclusion: As BMI increases insulin sensitivity decreases and insulin resistance increases.

Key words: Body mass index, Fasting insulin, Homeostatic model assessment, Insulin resistance, Insulin sensitivity, Quantitative insulin sensitivity check index

INTRODUCTION

The WHO consensus group concluded that insulin sensitivity of the lowest 25% of a general population can be considered as insulin resistant. As the clamp techniques are expensive, time-consuming and not very practical in office setting, the fasting state homeostatic assessment methods have been developed, which help to evaluate

insulin resistance or insulin sensitivity in a clinical setting. Increased waist to hip ratio compounded by increased body mass index (BMI) is called android obesity. It is associated with insulin resistance as it is more sensitive to catecholamines and less sensitive to insulin and is associated with glucose intolerance, diabetes, increased androgen production rate, decreased testosterone-estradiol binding globulin, increased free levels of testosterone and estradiol, dyslipidemia hypertension and cardiovascular risk factors and breast cancer.¹⁻³

IR may be due to genetic or acquired causes like defect in receptors, number of receptors or postreceptor mechanism at various stages-abnormalities of insulin signaling pathway, increased activity of protein tyrosine phosphatase which can attenuate insulin signaling by internalization and

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dephosphorylation of the receptor, mutations affecting insulin receptor numbers, splicing, trafficking, binding, and phosphorylation.^{4,6}

In skeletal muscle, GFAT carries out rate limiting step of hexose monophosphate pathway, i.e., conversion of fructose 6-p and glutamine to glucosamine 6-phosphate and glutamate. By a pathway that is unclear, glucosamine overproduction results in a disruption of the ability of insulin to cause translocation of glucose transporter type 4 to the cell surface resulting in hyperglycemia which in turn causes hyperinsulinemia.⁷⁻¹¹

Hyperinsulinemia causes insulin resistance by downregulating insulin receptors by receptor internalization and desensitizing post-receptor pathways. Weight gain increases free fatty acids (FFA) and triglyceride levels. Reduction in insulin-stimulated insulin receptor substrate-1 associated PI3-kinase may play a role in pathogenesis of insulin resistance.¹²

MATERIALS AND METHODS

We had selected 50 healthy women in reproductive age group of 18-34 years as subjects from out-patient clinics in Warangal. The subjects were divided into two groups based on their BMI by taking into consideration of BMI normal range additional cut-off points as 18.5-22.9 (Group I) and 23-24.99 (Group II).

Each subject was informed in detail of its objectives, the aims of the thesis protocol and the methods to be used. Their consent was obtained in the history. Any past or present intake of steroids is ruled out.

About 5 ml of blood sample was collected from a cubital vein in the morning after overnight fasting between 8 am and 9 am for the estimation of fasting blood sugar and fasting insulin. All the information obtained was recorded in case sheet pro forma and later analysis was done.

Flow-injection (FI) was estimated by chemiluminiscence method which is a type of immunoassay that uses certain compounds that emit light as they return from the activated to the resting state. In all the cases, the biochemical reaction leads to the formation of the electronically excited state which on decaying to the ground state emits photons of energy which are converted to light energy. The emitted light energy is quantified in three ways namely-peak light intensity, decay part integration and total light production.

BMI was calculated after measuring height in cm and weight in kg.

$$BMI = \frac{wt(kg)}{Ht^2(m)}$$

Among the many mathematical homeostatic models available two indices - homeostatic model assessment (HOMA) and quantitative insulin sensitivity check index (QUICKI) were selected, calculated, and compared between the two groups.

QUICKI can be applied to normoglycemic and hyperglycemic patients and is believed to be superior to HOMA as a way of determining insulin sensitivity although the two values correlate well. As the HOMA value decreases QUICKI value increases.

HOMA is frequently used to assess insulin resistance.

$$QUICKI = \frac{1}{[\log FBS(mg/dl)] + [\log FI(\mu u/ml)]}$$

$$HOMA = \frac{FI(\mu U/ml) \times FBS(mmol/l)}{22.5}$$

For conversion of blood sugar from mg/dl to mmol/l following formula was used:

- S.I. (mmol/l) = CF × C (mg/dl)
- When CF = 0.05551

Low HOMA values indicate high insulin sensitivity, whereas high HOMA values indicate low insulin sensitivity (insulin resistance).

RESULTS

The mean BMI in Groups I and II is 21.314 and 23.954, respectively, with $P < 0.0001$. There is a significant increase in BMI in Group II when compared to Group I.

The mean fasting insulin in Groups I and II is 4.724 and 9.772, respectively. There is a significant increase in FI in Group II when compared to Group I with $P < 0.0001$.

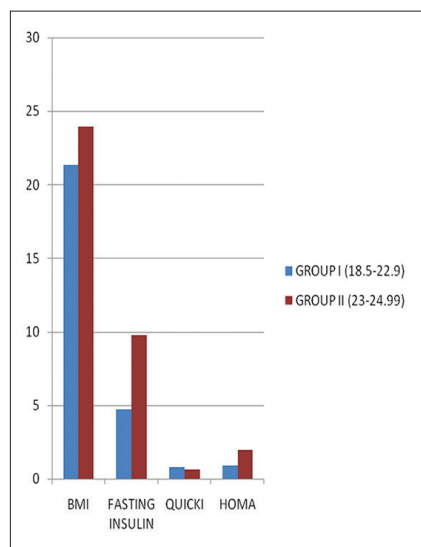
The mean value for QUICKI in Groups I and II is 0.882 and 0.64 with $P < 0.0001$. There is a significant increase in Group II when compared to Group I.

The mean value for HOMA in Groups I and II is 1.954 and 1.154 with $P < 0.0001$. There is a significant decrease in Group II when compared to Group I (Table 1).

Table 1: Comparison of insulin sensitivity and resistance

Parameter	(n=25) (mean±SD)	
	Group I	Group II
BMI (kg/m ²)	21.348±0.732	23.954±1.954
Fasting insulin (μU/l)	4.724±1.743	9.772±5.116
QUICKI	0.812±0.140	0.64±0.0746
HOMA	0.882±0.343	1.954±1.049

HOMA: Homeostatic model assessment, QUICKI: Quantitative insulin sensitivity check index, BMI: Body mass index, SD: Standard deviation



DISCUSSION

Weight gain is an independent factor for insulin resistance, and there is more marked dysregulation of insulin levels and impairment of insulin sensitivity in women with more BMI which may lead to hyperinsulinemia.

The insulin sensitivity and resistance in Group II in our study probably suggest post receptor defect or genetic factor causing more severe insulin resistance in addition to obesity. The raised insulin levels are able to dispose the blood sugar and maintain normal levels. These patients become overt diabetics only when the pancreas is exhausted or there is a coexisting defect in β cells of islets along with insulin resistance.¹³⁻¹⁶

A normal phase of insulin resistance appears due to obesity leading to increased serum fasting insulin levels to maintain normal glucose disposal. Due to interplay of genetic factors, obesity and postreceptor insulin defects the phase of insulin resistance becomes aggravated and persistent leading to endocrine and metabolic derangement.

“Hyperinsulinemia” by itself causes insulin resistance by downregulating insulin receptor internalization and

desensitizing postreceptor pathways. Insulin being antilipolytic and lipogenetic factor causes more abdominal fat deposition, aggravating obesity.^{17,18}

The clinical presentation of patients with insulin resistance depends on the ability of the pancreas to compensate for the target tissue resistance to insulin. During the first stages, when compensation is effective the only metabolic abnormality is hyperinsulinemia. Later on, when β cells fail to meet the challenge, the decreased insulin levels lead to impaired glucose tolerance test and frank diabetes.^{19,20}

CONCLUSION

BMI is an independent risk factor for insulin sensitivity and resistance that worsens the condition when imposed on other factors. Weight gain also induces atherosclerosis due to increased circulating FFA and triglycerides imposing more strain on the heart to maintain circulation.

1. Evaluation of insulin sensitivity, resistance rather than a single insulin value is a more sensitive indicator. The concept of insulin sensitivity and resistance is relatively easy to understand but determining precisely is more complicated. The relationship between glucose and insulin is quite complex and involves the interaction of many metabolic and regulatory factors. Weight control, diet modification like high fiber diet and low-fat diet with an increase in monounsaturated fats, lifestyle changes, exercise and screening with oral glucose tolerance test are to be considered for early recognition and intervention.

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Effect of Butorphanol as an Adjuvant in Epidural Analgesia for Inguinal Hernia Surgery

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Abstract

Background: The objective of the study was to compare the onset and duration of analgesia, hemodynamic parameters, sedation and the side effects between bupivacaine and bupivacaine with butorphanol in epidural anesthesia in patients undergoing inguinal hernia surgeries.

Materials and Methods: This prospective, randomized, double-blinded, controlled study. A total of 60 patients aged 18-60 years with the American Society of Anesthesiologist Grades I or II were enrolled into the study and were randomized to receive either plain bupivacaine or bupivacaine with butorphanol in epidural anesthesia. The hemodynamic parameters such as oxygen saturation, heart rate, systolic blood pressure (SBP), and diastolic blood pressure (DBP) were recorded during and after the procedure. The onset and duration of analgesia, sedation score, and complications if any were noted during intra- and post-operative period.

Results: The two groups were comparable with regard to age, gender, and weight with the $P < 0.05$. There was a significant fall in SBP and DBP in group BS when compared to group BB. There was a significantly earlier onset of analgesia in group BB with a mean duration of 18.33 min, and significantly prolonged duration of analgesia with a mean duration of 151.67 min. The onset of motor blockade was significantly shorter with a mean duration of 9.33 min. There was a significant sedation noted in group BB. No obvious side effects like vomiting and pruritus were noted.

Conclusion: In our study, we concluded that addition of butorphanol of 4 mg with bupivacaine in epidural for inguinal hernia surgery showed significant quickened onset and provided prolonged duration of analgesia without side effects other than significant sedation as compared with bupivacaine alone.

Key words: Bupivacaine, Butorphanol, Diastolic blood pressure, Duration of analgesia, Heart rate, Systolic blood pressure

INTRODUCTION

Pain is an unpleasant sensation which is only experienced and not expressed. The concept of intra- and post-operative pain relief has improved in the recent years. Post-operative pain gives rise to various physiological and psychological phenomenon. Proper management of

post-operative pain remains the most important pressing issues in the society. Post-operative pain gives rise to prolong hospital stay; delayed return to normal activities.^{1,2} Inadequately treated pain may produce chronic persistent pain after hernia surgery. Literature review shows that 11% patients suffered from chronic pain after hernia repair. Multimodal approaches have been used to treat pain after hernia surgery but optimal evidence-based pain therapy remains unknown.

Spinal anesthesia is the most common anesthetic technique being used for hernia repair. Even though spinal anesthesia provides an excellent pain relief in the early post-operative period, which has limitation like delayed ambulation and urinary retention.³⁻⁷

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Epidural administration of various drugs like opioids in addition with local anesthetics gives better pain relief and also reduces the stress response during the surgery. However, epidural administration of opioids like morphine produces untoward side effects like pruritus, vomiting, respiratory depression and urinary retention. The search for the better epidural adjuvant drug is continued until date.⁸ Butorphanol, a kappa (κ) agonist with weak mu (μ) agonist/antagonist with relatively high lipid solubility and lesser side effects has been used effectively to produce long-term post-operative pain relief by epidural route.^{9,10}

Therefore, we did a prospective, randomized, double-blinded study to assess the effect of butorphanol as an adjuvant in epidural analgesia for the patients undergoing inguinal hernia surgeries.

MATERIALS AND METHODS

After obtaining proper informed consent and approval of the Institutional Ethical Committee, 60 American Society of Anesthesiologist I and II patients with age group 18-60 years of both genders scheduled for elective hernia surgeries were included in our study. Patients with bleeding disorders, neuromuscular disease, spinal deformities, and injection site infection were excluded from the study. 60 patients were randomly allocated into two groups by serially numbered sealed envelope technique. Group BB received 15 ml of 0.5% bupivacaine and 2 ml of butorphanol (4 mg). Group BS received 15 ml of 0.5% bupivacaine and 2 ml of normal saline.

All the health-care providers providing direct patient care, the subject were blinded to the epidural medications administered. All the medications were prepared by the anesthetist who is unrelated to the study, and the epidural placement of the drug was given by another anesthesiologist who was also blinded.

For all the patients of both the groups pre-anesthetic checkup was done before the surgery and kept fasting for 8 h. Premedication of tablet ranitidine 150 mg and tablet metoclopramide 10 mg was given orally 1 h before surgery. In the operating room, monitors were attached and the baseline reading of heart rate (HR), non-invasive blood pressure, electrocardiogram, and oxygen saturation (SpO_2) were recorded. Then, intravenous line was placed and patients were pre-loaded with 15 ml/kg of ringer lactate solution. With all aseptic precautions, 16 g epidural needle was placed at L3-L4 intervertebral space by loss of resistance technique. The epidural catheter of 18 G was inserted for 5-6 cm in cephalad direction and 3 ml of 2% Lignocaine with adrenaline 1:2,00,000 test dose was

given after confirming negative aspiration of blood or cerebrospinal fluid. Epidural drug administration was done based on the allocation of the group as described above.

All patients were monitored for sensory blockade using pin prick method. Once T6 level of sensory blockade achieved, then surgery was allowed to begin. Sensory blockade assessment was done for every 5 min for the first 1 h and then for every 30 min for the next 3 h. Motor blockade assessment was done by Bromage scale for every 5 min for the first 30 min after drug administration. Visual analog score (VAS) for pain was recorded 30 min interval after 1 h of surgery for 4 h. Rescue analgesia was given when VAS scale becomes more than 4. Hemodynamic parameters such as HR, systolic blood pressure (SBP) and diastolic blood pressure (DBP), mean arterial blood pressure (MAP), and SpO_2 were monitored at every 5 min interval until 120 min then 30 min interval for further 3 h. Intraoperative hypotension and bradycardia was treated with IV fluids and titrated doses of ephedrine 6 mg and atropine of 0.6 mg intravenously. Sedation level was monitored by Ramsay sedation score for first 1 h of drug administration at 10 min interval. Any complications like nausea, vomiting, purities and allergic reactions were noted and managed by standard protocols.

RESULTS

A statistical analysis was performed with Student's *t*-test, Mann-Whitney *U*-test. The quantitative data were expressed in terms of mean and standard deviation. The statistical analysis was performed using SPSS version 20. All the information about the case was recorded in the master chart. The mean standard deviation *P* values were calculated. The *P* < 0.05 noted as the level of significance.

The demographic data such as the age and weight were comparable in both the groups shown (Table 1). The difference in onset of sensory blockade in group BB was 18.33 min which was shorter when compared with group BS (25.67 min). It was statistically significant (Graph 1). The duration of analgesia was prolonged in group BB (151.67 min) then group BS (101.33 min) which was statistically significant (Graph 1). Similarly, the onset of motor blockade in group BB (9.33 min) was shorter than the group BS (15.17 min) which was statistically significant (Graph 1). However, there was no significant change in the completion of motor blockade in both the groups BB of 13.17 min, whereas in group BS of 11.83 min (Graph 2).

Patient in group BB was more sedated and which was statistically significant after 20 min (Table 2). Regarding hemodynamic parameters, there was slight fall in both HR

Table 1: Demographic data

Parameters	Group BB (n=30)	Group BS (n=30)
Age (years)	12.02	14.29
Weight (kg)	62.9	67.9

Table 2: Sedation score

Time (min)	Mean±SD		P*
	Group BB (n=30)	Group BS (n=30)	
0	2.00±0.00	1.93±0.254	0.154
10	2.30±0.466	2.17±0.379	0.226
20	3.20±0.610	2.73±0.450	0.002*
30	3.43±0.568	3.10±0.305	0.005*
40	3.77±0.430	3.30±0.466	<0.001*
50	4.00±0.00	3.73±0.450	0.003*
60	4.03±0.320	3.80±0.407	0.018*

SD: Standard deviation

and MAP in group BB which was not statistically significant (Graphs 3 and 4). None of the patients developed vomiting or pruritus in both groups. In group BB 13% of patients experienced nausea only which was treated with ondansetron 4 mg intravenously.

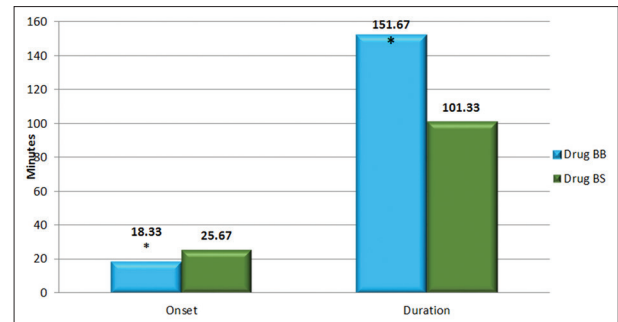
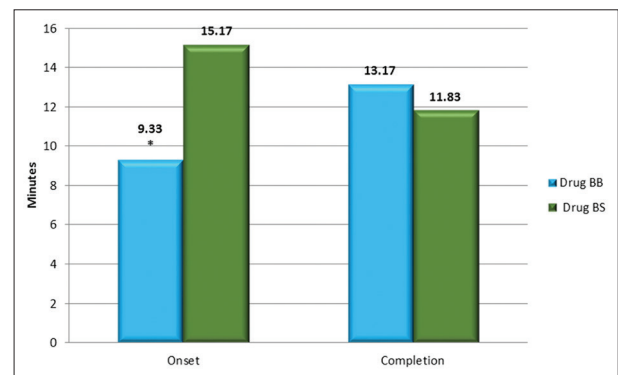
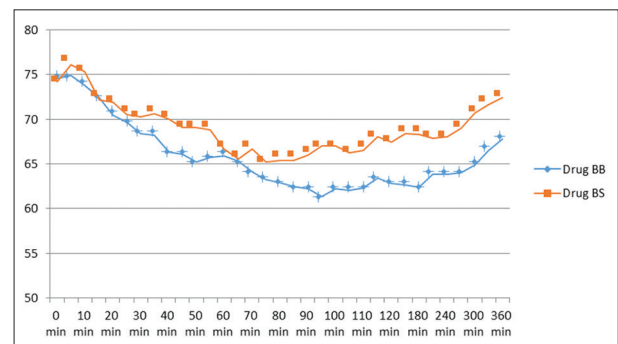
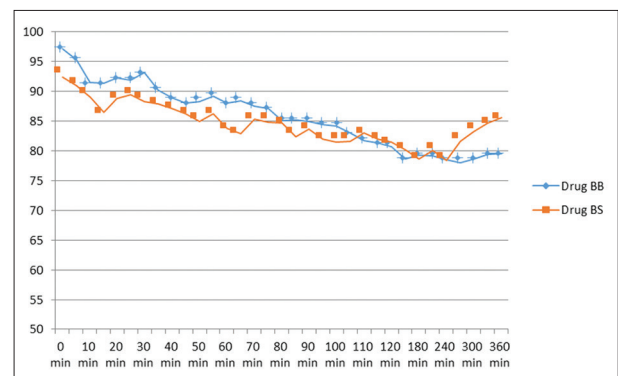
DISCUSSION

We conducted this prospective randomized double-blind study in an attempt to evaluate the effect whether administration of butorphanol with bupivacaine epidurally improves both the intra and post-operative analgesia in patients undergoing inguinal hernia surgeries.

Effective pain control is essential and has been recognized as a prime concern for anesthesiologist. An epidural route is used extensively for post-operative pain control. Bupivacaine is the most commonly used local anesthetic in epidural analgesia, but recently studies show addition of opioids as adjuvants produces the early onset of action and prolonged duration of analgesia with better hemodynamic stability and also dose-sparing effects.

In our study, we found that addition of butorphanol to bupivacaine showed faster onset of both sensory analgesia (18.33 min) as well as motor blockade (9.33 min), whereas in plain bupivacaine group which showed the onset of sensory as (25.67 min) and motor analgesia (15.17 min). Similarly, Devulapalli *et al.*,¹¹ state that epidural butorphanol has faster onset of action at 14.66 min were as with epidural morphine the onset was 34.76 min.

Hunt *et al.*¹² studied that epidural butorphanol-bupivacaine for analgesia during labor and delivery demonstrated that duration of complete analgesia is more with the addition

**Graph 1: Comparison of onset and duration of sensory blockade. *Significant P < 0.05****Graph 2: Comparison of onset and completion of motor blockade. *Significant P < 0.05****Graph 3: Changes in the mean heart rate for both groups****Graph 4: Changes in the mean arterial pressure for both the groups**

of 2 or 3 mg butorphanol to 0.25% bupivacaine than with plain bupivacaine group. In our study, we observe that duration of analgesia with group BB was 151.67 min which was significantly prolonged when compared with group BS of 101.33 min.

Agarwal *et al.*¹³ observed that combination of epidural buprenorphine with bupivacaine produces significant rapid onset of analgesia but has only shorter duration of analgesia. Gupta *et al.*¹⁴ observed that both butorphanol and tramadol were effective in relieving post-operative pain, however, quality of analgesia and patient satisfaction was more with butorphanol.

Regarding hemodynamics, epidural butorphanol produces only minimal cardiovascular changes even though there was a reduction in HR and blood pressure which was not statistically significant when compares with epidural bupivacaine group.

Opioids are well-known for its side effects such as pruritus, nausea, vomiting and respiratory depression. Delayed respiratory depression is due to poor lipid solubility nature. Hunt *et al.*¹² observed that there was a significant somnolence lasted approximately for 6 h in 13 out of 14 patients received more than 1 mg of butorphanol. In our study, we observed there was a significant sedation with group BB, but we observed only for 1 h as it needs more time to evaluate prolonged sedation scale. However, none of the patient went into respiratory depression. Mok *et al.*¹⁵ studied epidural butorphanol and morphine for relief of post-operative pain, they observed that butorphanol injected epidurally appeared to be safe, reliable method of providing prolonged pain relief and no clinical evidence of respiratory depression. The main advantage of butorphanol is its fewer side effects. Kaur and Bajwa,⁸ observed that fentanyl groups had a higher incidence of pruritus and vomiting when compared with butorphanol group were as nausea was present in both the groups. In our study, we observed nausea for few patients who received epidural butorphanol; we did not observe any other side effects such as vomiting and pruritus.

CONCLUSION

We conclude that the addition of butorphanol of (4 mg) with bupivacaine in epidural anesthesia significantly quickens the onset and prolongs the duration of analgesia, without any major side effects, except significant sedation as compared with bupivacaine alone.

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Prevalence of Trichomoniasis in Women Attending a Sexually Transmitted Disease Clinic in Mumbai

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Abstract

Introduction: Trichomoniasis, caused by the protozoan parasite, *Trichomonas vaginalis*, is a common but curable sexually transmitted disease (STD) affecting millions around the world. It can cause a variety of symptoms in women, namely, vaginal discharge, blood spotting, itching, redness and pain during sexual intercourse or urination. Trichomoniasis carries with it complications such as cervicitis, pelvic inflammatory diseases and tubal infertility, transmission to the baby, predisposition to human immunodeficiency virus and other viral infections.

Objective: The present study was undertaken to find out the prevalence of *T. vaginalis* infection in women attending an STD clinic in Mumbai with complaints of abnormal vaginal discharge.

Materials and Methods: High vaginal swabs were collected using a sterile lubricated speculum. The swabs were dipped in saline suspension and transported to the laboratory within 30 min. The centrifuged deposit was observed under phase contrast microscope ($\times 40$) for evidence of the parasite.

Results: *T. vaginalis* was detected in 44.6% (74/166) of the patients. Of those who tested positive for trichomoniasis 64.5% belonged to the 21-30 age groups. The prevalence was 14.3% among the pregnant women. Burning micturition was the most common complaint noted (68.2%) followed by erythema (38.6%) and vulval pruritus (38.6%).

Conclusion: Health education, routine screening, treatment of symptomatic and periodic presumptive treatment of asymptomatic women as well as her partner/s are necessary for effective control of the infection and other STDs at large.

Key words: Commercial sex workers, Sexually transmitted diseases, *Trichomonas vaginalis*, Trichomoniasis

INTRODUCTION

Trichomoniasis is a common but curable, non-viral^{1,2} sexually transmitted disease (STD) affecting millions around the world.^{3,4} The etiological agent is the protozoan parasite, *Trichomonas vaginalis*. It affects both men and women, but men usually have an asymptomatic infection and do not seek medical help. They can, however, be a source of infection to others. The vaginal epithelium, skene glands, bartholin glands and urethra are involved in women.⁵ It can cause a variety of symptoms, namely, vaginal discharge, blood spotting, itching, redness and pain

during intercourse or urination. Although it can lead to serious health consequences in pregnancy trichomoniasis is an under-recognized disease.⁶

Recent studies have shown that trichomoniasis is a strong predisposing factor for acquiring human immunodeficiency virus (HIV)³ due to the recruitment of target CD4 cells and macrophages to the site of infection and their binding^{7,8} along with the wear and tear caused to the vaginal mucosa.⁹ Early detection becomes even more necessary in this context especially in the sex workers due to multiple sex partners. Hence, the study was carried out with the aim to detect the parasite in women attending an STD clinic.

MATERIALS AND METHODS

The 1-year prospective study was conducted at one of the STD clinics of Municipal Corporation of Greater Mumbai. Of the 994 patients who attended the clinic

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during the study period, 166 patients with complaints of abnormal vaginal discharge were included. All patients were in the reproductive age group. The samples were collected after obtaining consent from the patients. The vagina was exposed using a sterile lubricated speculum under a powerful overhead lamp. The specimen was collected from posterior fornix of the vagina using sterile swabs. The physical characters of the discharge such as color, consistency, type and amount were noted.

The swab was dipped in saline suspension and transported within 30 min to the laboratory. The saline suspension was centrifuged at 3000 rpm for 6-7 min. A drop of the centrifuged sediment was taken on a clean glass slide and coverslip placed on it. This was observed under phase contrast microscope ($\times 40$) for evidence of the parasite. *T. vaginalis* was identified morphologically by its size, shape and characteristic jerking and twisting movements, trashing of flagella and the rippling of the undulating membrane. Culture was not attempted.

RESULTS

The frequency of abnormal vaginal discharge was 16.8% (166/994). Of those who tested positive for trichomoniasis, 64.5% belonged to the 21-30 age groups (Table 1).

T. vaginalis was detected in 45.8% (76/166) of the patients. There was no significant difference in the incidence of trichomoniasis in the commercial sex workers and others. The prevalence was 14.3% among the pregnant women (Table 2).

The discharge was profuse, mostly yellowish, mucoid, and thin in consistency in more than 75% of the cases (Table 3).

Burning micturition was the most common complaint noted (68.2%) followed by erythema (38.6%) and vulval pruritus (38.6%) (Chart 1).

DISCUSSION

The clinic is situated in one of the red-light areas of Mumbai and harbors floating population. The study group primarily comprised women of lower social strata in the reproductive age group including commercial sex workers (42.8%).

The prevalence of *T. vaginalis* in the study was 45.8%. There was only a slight preponderance in the incidence of trichomoniasis in the commercial sex workers (47.9%) as compared to others (44.2%) including pregnant women. The high incidence is probably because the

Table 1: Socio-clinical status and age-wise distribution of the patients

Status	Cases studied (%)
Non-pregnant women (not commercial sex workers)	81 (48.8)
Commercial sex workers	71 (42.8)
Pregnant women	14 (8.4)
Total cases	166

Age groups (year)	Number of cases (%)
15-20	30 (18.1)
21-25	40 (24.1)
26-30	69 (41.6)
31-35	12 (7.2)
36-40	9 (5.4)
41-45	6 (3.6)

Table 2: Prevalence of infection in various groups

Status of the patients	Number infected	% Incidence
Commercial sex workers (n=71)	34	47.9
Non-pregnant women (not commercial sex workers) (n=81)	40	49.4
Pregnant women (n=14)	2	14.3

Table 3: Gross appearances of the specimen

Appearance	Number (%)
Profuse discharge	33 (75)
Yellow color	26 (59.1)
Greenish yellow	7 (15.9)
Thin consistency	38 (86.3)
Mucoid	43 (97.7)

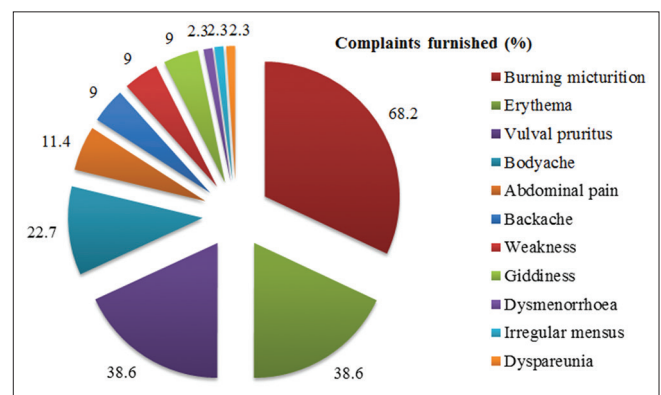


Chart 1: Complaints furnished by the patients

study included only women with complaints of abnormal vaginal discharge. In studies conducted in various parts of the world, such high prevalence has been reported mostly in those involving high-risk female sex workers (FSWs) or brothel-based, 21.9% in Nigeria,¹⁰ 51% in Papua New Guinea,¹¹ 62% in Papua New Guinea,¹² and 28% in Mongolia.¹³ However, this observation is at variance with a lower prevalence rate reported in FSWs in some

studies 9.0% in China,¹⁴ 7.6% in Argentina,¹⁵ and 7.2% in Sri Lanka.¹⁶

Trichomoniasis carries with its many complications including cervicitis, pelvic inflammatory diseases and tubal infertility,¹⁷ predisposition to HIV and other viruses such as herpes, human papillomaviruses as well as the risk of transmission to the baby from the infected birth canal, premature rupture of membranes, premature labor, low birth weight and post-abortion infections.^{18,19} Varying incidences have been reported in pregnant women ranging from 5.0 to 5.5%²⁰ and 10.9%.²¹ In this study, the prevalence rate was 14.3% though a good representation cannot be made as the study was not carried out exclusively in pregnant women. As the infection can persist for long periods in the female urogenital tract¹ timely intervention is crucial.

Routine screening with a simple and rapid test like microscopic examination of wet-mount preparation of the vaginal discharge with sensitivity 60-80%^{3,9,22} can be employed as a point-of-care diagnostic test. Many studies have reported that culture methods have better sensitivity²¹⁻²⁴ and molecular techniques^{2,25} are superior for detection. However, as these facilities are not available in most hospitals direct wet microscopic examination of vaginal swab specimens remains the test-of-choice and may be followed till a cheap, more sensitive point-of-care diagnostic test becomes available.⁴

CONCLUSION

Screening, health education to the high-risk groups regarding safe-sex practices, hygiene, timely treatment of symptomatic and periodic presumptive treatment of asymptomatic women and her partner/s will bring down the incidence as has been possible in some of the industrialized cities such as London²⁶ and Melbourne.²⁷

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Obesity and Salivary Parameters (Flow Rate, Buffer Capacity, and Salivary pH) in Children of Moradabad, India

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Abstract

Introduction: According to the World Health Organization, by 2015 approximately 2.3 billion adults worldwide will be overweight and more than 700 million obese.

Aim: To evaluate the relationship between obesity and salivary parameters (salivary flow rate, buffer capacity, and pH) among 14 and 15-year-old school children of Moradabad, India.

Materials and Methods: A study was conducted among 25 obese and 25 normal weight children. Anthropometric measurements were performed to obtain body mass index (BMI). Those children whose BMI $>30 \text{ kg/m}^2$ were considered as obese and those with BMI in between 18 and 25 kg/m^2 , as non-obese. Those students who gave the consent in participation fulfilled the eligibility criteria were included in the study. The subjects' salivary parameters were estimated using GC Saliva-Check Kit. All the participants were examined for the plaque and bleeding on probing and dental caries experience.

Results: The mean BMI of obese and non-obese subjects was found to be 30.98 kg/m^2 and 21.91 kg/m^2 , respectively, and the difference was found to be statistically significant. On comparing the salivary flow rate, salivary pH, and salivary buffer capacity between obese and non-obese children, the difference was found to be statistically significant ($P = 0.00$).

Conclusion: It was concluded that obesity is one of risk factors responsible for deranged salivary parameters that in turn has an adverse effect on oral health.

Key words: Obesity, Children, Saliva

INTRODUCTION

Obesity and overweight are defined as being an excess of body fat related to lean mass, with multifactor conditions, involving psychological, biochemical, metabolic, anatomic, and social alterations.¹ Spending too much time watching television or playing electronic games together with substituting

industrialized food (rich in carbohydrates/fats and poor in fiber) for processed foodstuffs are the main causes of obesity and overweight.² The prevalence of child obesity is increasing rapidly worldwide. Childhood obesity presents both immediate and long-term health risks. It is associated with several risk factors for later heart disease and other chronic diseases including hyperlipidemia, hyperinsulinemia, hypertension, and early atherosclerosis.³ These risk factors may operate through the association between child and adult obesity, but they may also act independently.⁴

While obesity has been proved to be a risk factor for the general health of an individual, its adverse effect on oral health cannot be ignored. Several cross-sectional studies have demonstrated that obesity is associated with chronic

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periodontitis in adults.⁵ Moreover, a link between obesity and dental caries has also been explored. Most of the studies regarding the association between obesity and dental caries are based on clinical data expressing caries experience reflecting not only the actual caries situation but also previous accumulation of caries and filled surfaces. Although there are clinical studies demonstrating a relationship between obesity and dental caries,⁶ contradictory results are also present.⁷ The association between dental caries and obesity is complicated because both are complex conditions with multiple contributing factors including biological, genetic, socioeconomic, cultural, dietary, environmental, and lifestyles issues.

Together with other risk indicators to decay, the salivary flow, pH, and buffer capacity become useful to diagnose the potential cariogenic activity and to predict the risk to caries for an individual.⁸

Obesity is linked to chronic inflammation and a number of adipose-related pro-inflammatory cytokines, so-called adipokines, are enhanced in plasma from obese subjects contributing to enhanced inflammatory response in many body organs.⁹ The immune system modulates central nervous system function particularly by cytokines, and the hypothalamic-pituitary-adrenal axis is reported to be dysregulated in subjects with abdominal obesity. Altered function of the hypothalamic-pituitary-adrenal axis may affect the neuroendocrine regulation of salivary glands characterized by diminished salivary gland secretion.¹⁰ Decreased Salivary flow rate, in turn, reduces its buffer capacity and hence shifts the oral environment to acidic pH. As very few reports are present in the literature regarding the association of obesity and salivary parameters among adolescents; hence, a study was conducted to find out if there exists any relation between obesity and salivary parameters among 14 and 15-years-old school children in Moradabad, India.

MATERIALS AND METHODS

A study was conducted among 25 obese and 25 normal weight children of age group 14 and 15 years old. Before conduct of the study, the ethical clearance was taken from the Institutional Ethics Review Board, Kothiwal Dental College and Research Centre, Moradabad. A convenient sample was selected from few private schools in Moradabad, Uttar Pradesh, India, upholding the same socioeconomic status. Anthropometric measures were performed to obtain body mass index (BMI). Those children whose BMI $>30 \text{ kg/m}^2$ were considered as obese (cases) and those with BMI in between 18 and 25 kg/m^2 , as non-obese (controls); and their consent of participation in the study was taken.

The cases and controls were matched with respect to age and gender. The study participants who were on medications or suffering from systemic diseases such as diabetes or undergoing any orthodontic/periodontal treatment were excluded from the study. In addition to the demographic data, the subjects were asked about their parents' educational qualification, the frequency of tooth brushing, dental visits, and food intake. The subjects' salivary parameters, i.e., their salivary flow rate, buffer capacity, and its pH were estimated using GC Saliva-Check Kit (GC Asia Dental Pvt. Ltd-India; Lot: 1205111). All subjects' salivary parameters were estimated between 10 and 11 am, and they were instructed not to eat/drink anything and to refrain from brushing their teeth, 1 h before the conduct of the study. All the participants were examined for the plaque (O' Leary Plaque Index, 1967) and bleeding on probing (BOP) (Ainamo and Bay, 1975), and dental caries experience (using decayed-missing-filled teeth [DMFT] index).

Salivary Analysis

Estimation of stimulated salivary flow rate

The participants were asked to chew the paraffin wax, and after 30 s, they were asked to expectorate into the spittoon and continued chewing for 5 min. Then, saliva was collected into the graduated collection cup for 5 min at regular intervals. Then, the flow rate was obtained by dividing the quantity of saliva collected, by 5 to get the flow rate in ml/min.

Estimation of pH and buffer capacity

The pH strips, in GC Saliva-Check Kit, were used to evaluate the salivary pH by dipping the strip into the sample for 10 s and then comparing the color change using the standard color chart, provided in the saliva GC kit. The buffer capacity was calculated by dispensing the saliva drops onto the three test pads on each buffer strip and then the color change was observed after 2 min to record the buffer capacity by adding the points according to the final color of each test pad.

Then, the data collected was statistically analyzed using Chi-square test, *t*-test, and Mann-Whitney U-test.

RESULTS

The mean BMI of obese and non-obese subjects was found to be 30.98 kg/m^2 and 21.91 kg/m^2 , respectively, and the difference was found to be statistically significant. On comparing the salivary flow rate, salivary pH, and salivary buffer capacity between cases and controls, the difference was found to be statistically significant ($P = 0.00$). The mean DMFT among obese and non-obese subjects was 3.76 and 3.80, respectively, and the difference between the two was

not found to be statistically significant ($P = 0.75$) (Table 1). The scores for plaque and BOP were dichotomized as present or absent for easy analysis.

A negative correlation was found between BMI and salivary flow rate, buffer capacity, and salivary pH; which was found to be statistically significant (Table 2).

DISCUSSION

According to the World Health Organization, by 2015 approximately 2.3 billion adults worldwide will be overweight and more than 700 million obese.¹¹ Burden of the associated cardiometabolic risk components, such as Type 2 diabetes mellitus, dyslipidemia, and cardiovascular disease, is also growing rapidly. Excessive body fat and its metabolic consequences are worldwide epidemics.¹² Obesity has also been associated with an increased risk for periodontal disease¹³ as well as dental caries.⁷ The adverse effect of obesity on the periodontium may be mediated through pro-inflammatory cytokines such as interleukins (IL-1, IL-6, and tumor necrosis factor- α), adipokines (leptin, adiponectin, resistin, and plasminogen activator inhibitors-1), and several other bioactive substances such as reactive oxygen species, which may affect the periodontal tissues directly.¹⁴

Table 1: Comparison of frequency of variables among obese and non-obese subjects

Variable	Mean (SD)		P-value
	Obese	Controls	
BMI	30.98±0.6	21.91±1.4	0.00*
Salivary flow rate	0.50±0.1	0.74±0.1	0.00*
Salivary buffer capacity	6.8±1.8	9.6±1.7	0.00*
Salivary pH	6.45±0.3	6.8±0.2	0.00*
DMFT	3.7±1.2	3.8±1.0	0.75 (NS)
Plaque			
Present (%)	18/25 (72)	14/25 (56)	0.18
Absent (%)	7/25 (28)	11/25 (44)	
BOP			
Present (%)	10/25 (40)	8/25 (32)	0.38
Absent (%)	15/25 (60)	17/25 (68)	

* $P < 0.05$, Statistical significance at $P < 0.05$. DMFT: Decayed-missing-filled teeth, BMI: Body mass index, BOP: Bleeding on probing, SD: Standard deviation

Table 2: Linear correlation of BMI and DMFT with salivary parameters (salivary flow rate, buffer capacity, and pH)

Parameters	Spearman's rho	Salivary flow	Salivary buffer	Salivary pH
BMI	Correlation coefficient	-0.709**	-0.651**	-0.697**
	Significant (two-tailed)	0.000	0.000	0.000
DMFT	Correlation coefficient	-0.047	-0.114	-0.123
	Significant (2-tailed)	0.747	0.432	0.396

**Correlation is significant at the 0.01 level (two-tailed).

DMFT: Decayed-missing-filled teeth, BMI: Body mass index

It is possible that being overweight is also a determinant of hyposalivation and thus increases the risk of caries.¹⁵ Saliva composition, together with its flow, seems to be a relevant factor in the etiopathology and progression of the decay.¹⁶ The more saliva is produced, the more protection against dental caries.^{17,18} It contains innate or acquired defense factors, able to inhibit bacterial growth and its metabolism through different mechanisms.¹⁷ Saliva is able to modify the pH of the oral cavity, from acidic to neutral. Hence, its normal flow rate is essential for maintaining good oral health.

In the present study, we tried to analyze if any association of salivary parameters with obesity exists or not. The cutoff value of stimulated salivary flow rate of 0.5 ml/min was considered to be an indication of hyposalivation.¹⁹ It was found that the mean stimulated salivary flow rate was 0.50 ml/min in obese children, and it was 0.74 ml/min in normal weight children, and the difference between the two was found to be statistically significant. This finding is similar to previous studies, wherein it is stated that hyposalivation is linked to obesity; as obesity causes chronic inflammation and a number of pro-inflammatory cytokines which increases the inflammatory response in many body organs, thus altering the function of hypothalamic-pituitary-adrenal axis that affects the neuroendocrine regulation of salivary glands and hence results in diminished salivation.¹⁰

In the present study, it was found that salivary pH had a negative correlation with BMI. The reason might be due to the decrease of salivary flow rate, with increase in BMI, the pH also decreases. This observation corroborates with the previous studies which emphasize the fact that the salivary function depends on its flow rate and composition. The saliva flow rate is also a modulator of salivary pH. At low flow rates, less bicarbonate is released, hence decreasing the pH.²⁰

Yang *et al.* (2001) in their study reported that plasma adiponectin, adipocyte-derived protein, concentration, however, unlike other adipocytokines, is decreased in adiposity and increases after weight reduction.²¹ Moreover, the change in pH in obese individuals is also due to alterations of adiponectin concentration. Normally, it is produced by salivary gland epithelial cells where it might be implicated in regulation of local immune response and hence preserves a good salivary function and maintains the salivary pH.²²

Wikner and Soder²³ found poor salivary flow rates may predict poor buffering capacity. Moritsuka *et al.*²⁴ reported that patients with a good buffering capacity had associated high salivary flow rates while another study found that there was an increase in buffering capacity as the salivary

flow rate increased. Similarly, in the present study, it was found that the buffer capacity of saliva decreased with the increase in BMI, which might be due to decrease salivary flow rate among obese subjects.

In the present study, it was found that there was no statistically significant difference in DMFT between obese and non-obese subjects. There are contradictory results shown by previous researchers where some of the studies⁷ have demonstrated a positive association of obesity and dental caries while as many other studies showed no significant relation of obesity with dental caries.²⁵

These data contribute toward the multifactor aspect of both diseases (dental caries and obesity). The concept of dental caries, which was initially based on a model proposed, in 1962 (host, diet, and microorganisms), is inadequate in the present scenario where lifestyle has changed altogether. The modern concept of dental caries includes social and behavioral factors regarding a particular individual. In turn, obesity has been associated with diet, genetic, behavioral, and psychological factors. Hence, all these factors need to be taken into considerations while evaluating the relation between obesity and dental caries.

In the present study, 40% of obese individuals were found to have BOP, whereas 32% of non-obese children had BOP, but the difference between the two was not statistically significant ($P = 0.38$). This finding does not corroborate with previous studies. A cohort study demonstrated that overweight and obesity are associated with gingival inflammation and dental calculus in young adults, showing the evolution of periodontal conditions over the years.²⁶ According to Susin *et al.*, 2011,²⁷ the presence of dental calculus and gingival bleeding in adolescents is considered risk factors for the development of chronic and aggressive periodontitis, reinforcing the importance of controlling these factors in early life.

Moreover, in the present study, dental plaque was present in 72% of the obese subjects, whereas it was present in 56% of non-obese subjects, and the difference was not found to be significant ($P = 0.18$). These findings are not in agreement to the results of earlier studies, which might be due to the difference in sampling, study design, and diagnostic criteria. In previous studies, it has been observed that the relationship between poor periodontal condition and high plaque scores was highly significant;²⁸ hence, the establishment of healthy habits like proper oral hygiene maintenance in childhood could be an important factor for disease prevention in adult life. It has been observed that tooth brushing enhances the salivary flow rate. Hence, in addition to the measures taken for preventing obesity, the personal behavioral changes, such as proper oral hygiene

maintenance, are of utmost importance to compensate for the adverse systemic effects of obesity on salivary parameters and oral health as a whole.

The limitations of the present study were that the dietary patterns could not be controlled which might have an effect on obesity, dental caries, and salivary parameters. Furthermore, the onset of obesity could not be taken into consideration. So, within the limitations of the study, it was concluded that obesity is one of the factors responsible for deranged salivary parameters, i.e., diminished stimulated salivary flow rate, buffer capacity, and salivary pH which in turn has an adverse effect on oral health.

A multidisciplinary action for controlling obesity will be beneficial not only for maintaining general health but also the oral health by both medical and dental health care professionals. It is recommended that a common risk approach should be adopted instead of focusing on a specific disease which is quite essential for promoting health in an economical way.

- As there has been found the association between obesity and oral health, so it calls for the collaborative measures between pediatric dentists and medical physicians in preventing the development of obesity and its associated health problems.
- As there has been a noticeable increase in the number of obese children visiting the pediatric dentists for their treatment, so it becomes the moral obligation of the dentists to educate both the patients as well as their parents for the control of obesity.
- Preventive and interventional efforts by experts in obesity in collaboration with pediatric dentists and dental educators can prove beneficial to the community.

CONCLUSION

It was concluded that obesity is be one of risk factors responsible for deranged salivary parameters that in turn has an adverse effect on oral health.

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Histopathological Study of Malignant Oral Tumours: A Five-Year Study

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Abstract

Introduction: Oral tumors are one of the most challenging tumors regarding their good prognosis if diagnosed early and very difficult to control in advancing stages.

Objectives: To study the prevalence, histopathological types and clinical presentation of various malignant oral tumors and their precursor lesions.

Materials and Methods: This study includes the analysis of oral tumors received in the histopathology section of Department of Pathology, Government Medical College, Miraj, Maharashtra, over a period of 5-year that is from August 2008 to June 2013. Data - such as age, sex, site of lesion, clinical presentation, histopathological type of tumor, and personal habits such as tobacco chewing, and smoking - were collected and analyzed.

Results: A total of 642 cases were analyzed during the study period. Malignant lesions were the most common oral lesions accounting to about 51.40%. The most common site was buccal mucosa 49.39%, followed by tongue 20.60%. Males were more commonly affected than females 70.9%. Out of 330 cases, 92.74% were conventional squamous cell carcinoma; other malignant lesions noted in our study were verrucous carcinoma 4.55%, spindle cell carcinoma 0.60%, papillary carcinoma 0.60%, basaloid carcinoma 1.21%, and one case of metastatic adenocarcinoma 0.30%. Tobacco chewing was the most common associated risk factor among all cases 82.89%. Mild dysplasia was the most common epithelial precursor lesion 53.34%.

Conclusion: Histopathological examination of all oral lesions is necessary for confirmation and early diagnosis in oral malignancy as it has a major influence on the prognosis in such cases.

Key words: Oral lesions, Squamous cell carcinoma, Tobacco chewing

INTRODUCTION

Oral cancer is a major health problem in certain parts of the world.¹ It is usually preceded by specific lesions and conditions called as precancerous lesions. Among these, the most common precursor lesions are leukoplakia, erythroplakia, erythroleukoplakia, oral submucous fibrosis, Lichen planus, etc.²

Some of the oral lesions may exhibit similar clinical features thus rendering the diagnosis more challenging. For

example, the differential diagnosis between nonneoplastic proliferative disorders and benign mesenchymal tumors and between leukoplakia and squamous cell carcinoma (SCC), often poses challenging situation, requiring prior knowledge of demographic characteristics associated with the occurrence of lesion to establish a clinical diagnosis. Biopsy and histopathological examination are important complementary diagnostic tools that are strongly influenced by the clinical data.³

There is a wide variation in the incidence and mortality rates of oral cancer in different regions around the world. The highest rates are reported in south Asian countries such as India and Sri Lanka. The death rate associated with oral cancer is high as most of the times it is diagnosed in late stages and is often discovered when it has metastasized to another location most likely lymph nodes of the neck. Oral cancer is particularly dangerous because in its early stages it may not be noticed by the patient, so it prospers

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without producing any pain or symptoms. Furthermore, it has a high risk of producing second, primary tumors. This means the patient who survives a first encounter with the disease, has up to 20 times higher risk of developing second cancer. The heightened risk factor can last for 5-10 years after the first occurrence.⁴

Leading states with a high incidence of oral malignancies in India include Delhi, Bhopal, and Ahmadabad. In Maharashtra, Nagpur has the highest number of oral malignancies cases. Other cities are Aurangabad, Mumbai, Pune, and Barshi.⁵ This high incidence may be related to risk factors such as tobacco chewing, smoking among people in this region. Our study has highlighted the high incidence of oral malignancy even in the western region of Maharashtra.

MATERIALS AND METHODS

This study was conducted in the Pathology Department of Government Medical College, Miraj, Maharashtra, from August 2008 to June 2013. It was a 5 years study, 1 year retrospective and 4 years prospective and is a cross-sectional study. A total of 642 oral lesions were studied. The material comprised biopsies and excision specimens.

Inclusion Criteria

Oral tumors, specimens which are adequate and representative of the lesion, resected surgical specimens such as hemiglossectomy, hemimandibulectomy, wide local excision, modified radical neck dissection (MRND), punch biopsies, wedge biopsies, etc.

Exclusion Criteria

Inadequately preserved specimens, neoplasms of nasopharynx and oropharynx, neoplasms of odontogenic origin, bone tumors of mandible and maxilla.

The formalin-fixed specimens were subjected to detailed gross examination. The lesions were diagnosed after studying the gross and microscopic features. The tumors were classified according to the recent WHO classification.

RESULTS

Table 1 shows distribution of tumours and tumourlike lesions of oral cavity in total oral biopsies.

Table 1: Distribution of tumors and tumor like lesions of oral cavity in total oral biopsies

Total number of oral biopsies (%)	Number of tumors (%)			Tumor like lesions (%)	Inflammatory lesions (%)
	Benign	Malignant	Epithelial precursor lesions		
642 (100)	70 (10.90)	330 (51.40)	30 (4.67)	95 (14.79)	117 (18.24)

Table 2 shows agewise distribution of malignant and epithelial precursor lesions of oral cavity.

Table 2: Age wise distribution of malignant and epithelial precursor lesions of oral cavity

Age in years	N (%)	
	Malignant tumors	Epithelial precursor lesions
1-10	00 (0)	00 (0)
11-20	00 (0)	00 (0)
21-30	07 (2.12)	02 (6.67)
31-40	49 (14.85)	03 (10)
41-50	72 (21.82)	15 (50)
51-60	106 (32.12)	05 (16.66)
61-70	51 (15.45)	03 (10)
71-80	37 (11.22)	02 (6.67)
81-90	08 (2.42)	00 (0)
Total	330 (100)	30 (100)

Table 3 shows genderwise distribution of malignant and precursor lesions of oral cavity.

Table 3: Gender wise distribution of malignant and precursor lesions of oral cavity

Gender	N (%)	
	Malignant	Epithelial precursor lesions
Male	234 (70.9)	19 (63.34)
Female	96 (29.1)	11 (36.66)
Total	330 (100.00)	30 (100.00)

Table 4 shows distribution of various clinical features of malignant and precursor lesions of oral cavity.

Table 4: Distribution of various clinical features of malignant and precursor lesions of oral cavity

Symptoms	Malignant tumors	Epithelial precursor lesions
Swelling	20	-
Ulceroproliferative growth	280	-
White patch	23	09
Mucosal irregularities	14	21
Pain	45	04
Difficulty in chewing	35	03
Excessive salivation	09	04

Table 5 shows sitewise distribution of malignant and precursor lesions.

Table 6 shows histological types of malignant and precursor lesions of oral cavity.

Table 5: Site wise distribution of malignant and precursor lesions

Site	N (%)	
	Malignant tumors	Epithelial precursor lesions
Buccal mucosa	163 (49.39)	14 (46.67)
Tongue	68 (20.60)	07 (23.35)
Hard palate	16 (4.84)	02 (6.66)
Soft palate	04 (1.21)	00 (00)
Gingiva	30 (9.09)	03 (10)
Floor of mouth	-	-
Upper lip	11 (3.37)	02 (6.66)
Lower lip	22 (6.66)	01 (3.33)
Trigone	16 (4.84)	01 (3.33)
Total	330 (100)	30 (100)

Table 6: Histological types of malignant and precursor lesions of oral cavity

Malignant lesions	N (%)	Epithelial precursor lesions	N (%)
SCC-conventional	306 (92.74)	Mild dysplasia	16 (53.34)
Verrucous carcinoma	15 (4.55)	Moderate dysplasia	05 (16.66)
Papillary carcinoma	02 (0.60)	Severe dysplasia	05 (16.66)
Basaloid SCC	04 (1.21)	Leukoplakia	02 (6.66)
Spindle cell SCC	02 (0.60)	Submucous fibrosis	02 (6.66)
Metastatic adenocarcinoma	01 (0.30)	-	-

SCC: Squamous cell carcinoma

Table 7 shows distribution of SCC of oral cavity based on histological grade and site.

Table 7: Distribution of SCC of oral cavity based on histological grade and site

Site	Grade I	Grade II	Grade III	Total (%)
Buccal mucosa	96	44	23	163 (49.40)
Tongue	35	21	12	68 (20.60)
Palate	15	03	02	20 (6.06)
Gingiva	20	09	01	30 (9.09)
Lip	23	08	02	33 (10)
Trigone	07	09	00	16 (4.85)
Total (%)	196 (59.39)	94 (28.48)	40 (12.12)	330 (100)

SCC: Squamous cell carcinoma

DISCUSSIONS

The orofacial region including the oral cavity and related tissues can be the site of a multitude of neoplastic lesions. These lesions can be malignant, benign or tumor-like lesions.⁶ Oral cancer is a major health problem in certain parts of the world. It is the 6th most common cancer in the World 1. Globally, there are around 2,70,000 new cases annually and 1,45,000 deaths, of which two-thirds occur in developing countries. The Indian subcontinent accounts for one-third of the world burden. Oral cancer is the most common form of cancer and accounts for much

cancer-related deaths among men in India. The detection of small, early stage oral cancer has been shown to lead to significantly reduced mortality and morbidity.

In this study, malignant and epithelial precursor lesions comprised 51.40% and 4.7%, respectively, among all oral biopsies. The observed epithelial precursor lesions in our study were categorized as mild dysplasia, moderate dysplasia, severe dysplasia, leukoplakia, and submucous fibrosis. All cases usually presented as mucosal irregularities and white patch in the case of leukoplakia and submucous fibrosis. The most common site for these lesions was buccal mucosa followed by tongue. The most common age group for epithelial precursor lesions was 5th decade, followed by males were more commonly affected than females 63.34%, and this can be attributed to unhygienic oral habits such as chewing of tobacco and pan by males. All these findings are comparable to the findings of study done by Muhsen and Al Raheem² and also with the previous literatures, which recorded a prevalence ranging from 0.2% to 20.4%.⁷⁻⁹ Buccal mucosa was the most common site for these lesions in study done by Waldron and Shaffer,¹⁰ but Muhsen and Al Raheem reported tongue as the most common site. It was interesting to note that the peak age incidence for epithelial precursor lesions was 5th decade, whereas for the malignant tumors it was 6th decade.

Among the malignant lesions, the observed SCC prevalence in our study was about 98% which is comparable with studies done by Neville *et al.*, Sapp *et al.*^{11,12} However, the study was done by Riaz and Warriach showed much lower prevalence of 69%.⁶ The most common histopathological type of malignant tumor was SCC conventional type accounting to about 92.74%, as reported by all literature.¹³⁻¹⁶ Other histopathological types seen were verrucous carcinoma (4.55%), spindle cell carcinoma (0.60%), basaloid carcinoma (1.21%), papillary carcinoma (0.60%), and one case of metastatic papillary adenocarcinoma (0.30%). Riaz and Warriach reported 69% of SCC along with other types of malignant tumors such as salivary gland tumors and sarcomas and ameloblastoma. The majority of the SCC were noted in the 6th Decade. The youngest patient with SCC in our study was 27-year-old male and oldest patient was 91 years. However, the peak incidence of malignancy varies in different population groups. In western countries, the peak incidence occurs at 60-70 years while in Asia it appears generally earlier at about 50-60 years. These results are mostly related to the race and habits of these population groups. Our results are comparable with studies done by Krishna *et al.*, and Khandekar *et al.*^{17,18}

It was observed that malignant lesions were more common in males than in females 2.4:1, which was comparable with

Hussein, Lumukana and King.¹⁹ However, a very high ratio of 5:1 was noted by Varshney *et al.*²⁰ This difference is again attributed to tobacco chewing and smoking habits among males.

The most common site for malignant lesions in our study was buccal mucosa 49.39%, followed by tongue 20.60%, which is comparable with study done by Haribhakti and Mehta, Wahid *et al.*^{21,22} The study done by Moore and Catlin shows buccal mucosa as the most common site of oral malignancy because of keeping tobacco quid in buccal mucosa for a longer duration.²³ Other sites reported were gingiva, palate, floor of mouth, which are again related to the different chewing habits in the population sample screened.^{7,24}

Ulceroproliferative growth was the most common clinical presentation (84.9%) by the patients which is in comparison with study reported by Krishna *et al.*,¹⁸ while Varshney²⁰ reported difficulty in chewing as the main presenting symptom and swelling was the main symptom in studies reported by Muhsen and Al Raheem, Rasheed.^{2,24} The difference in these clinical presentations may be related to the late presentation of the patients and also the histopathological type of the tumor in various studies.

Among SCC, well differentiated SCC (Grade I) contributed to about 59.39% of all SCC which has good prognosis and is comparable with the findings of Ahluwalia *et al.*,²⁵ the number of PDSCC was much more in study done by Khandekar *et al.*, (18.75%)¹⁸ when compared to our study (12.12%).

Metastatic tumors to oral cavity: Metastatic tumors in the oral cavity are very rare accounting for about 1% of all malignant oral tumors. Review of literature revealed only 63 cases of gingival soft tissue metastasis.^{26,27} In our study, one rare case of metastatic adenocarcinoma from gingival epithelium (GE) junction to gingiva in a 60-year-old male patient was encountered. He was a known case of GE junction adenocarcinoma on chemotherapy, who presented with a globular soft tissue gingival swelling. The clinical and radiological diagnosis was Fibroma, but only on histopathological examination, it was reported as metastatic adenocarcinoma. Other studies have also reported metastatic malignancies to the oral cavity. A case of metastatic prostatic adenocarcinoma to mandible was reported by Riaz and Warriach.⁶

Lymphnode Metastasis in MRND Specimens

In our study, out of 46 MRND specimens, the majority of them belonged to lip carcinoma (%). 38.88% of cases showed positive lymph node metastasis and in all these cases the tumor depth of invasion was >5 mm. The

maximum depth of invasion noted in our study was 2 cm, which was seen in the case of buccal mucosa carcinoma. Depth of invasion is the most significant predictor for cervical nodal metastasis in early SCC of the oral cavity. Patients with a tumor depth of ≥ 5 mm are at increased risk of harboring node metastasis and hence should be taken up for elective node dissection. Cervical metastasis is a known indicator of poor prognosis in the oral cavity. Five cases of granulomatous lymphadenitis were also noted in our study. Three cases showed evidence of extranodal extension. Extranodal extension is a predictor of regional relapse and criteria for post-operative radiotherapy.²⁸

CONCLUSIONS

Histopathological examination of all oral lesions is important for typing and to rule out malignancy. In this small study, we have demonstrated that malignant lesions are the most commonly encountered lesions and development of these tumors have a strong correlation with lifestyle habits such as tobacco chewing and smoking. The oral cavity is accessible for visual examination, and oral cancers and premalignant lesions have well clinical diagnostic features. The early detection has better curing rates and it will also reduce the cost for the treatment. People who are habitual tobacco quid chewers, smokers, and alcoholics must undergo screening regularly so that oral cancer can be identified as early as possible as it belongs to one of the preventable cancers.

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Hip Pathology Findings on Magnetic Resonance Imaging: A Study from Tertiary Care Institute

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Abstract

Introduction: The development of cross-sectional and multiplanar musculoskeletal imaging techniques, particularly magnetic resonance imaging (MRI) has ushered in a new chapter in the clinical approach to hip pathologies. Modern MRI greatly contributes to the assessment of symptomatic hip joints and demonstrates preoperatively nearly every cause of symptomatic hip pathology.

Materials and Methods: It was a cross-sectional study carried out in a tertiary care institute from 2014 to 2015. A total of 60 cases with hip pathology attending Orthopedics OPD and consenting to participate were included in the study. All the consenting participants were subjected to MRI scan.

Results: Avascular necrosis was the most common pathology detected comprising 25 of the 50 cases (50%). The next most common abnormality detected was infective arthritis, found in 13 (21.6%) cases. Two cases of transient bone marrow edema syndrome were detected, in one case the involvement was bilateral, whereas unilateral in the other. One patient diagnosed with carcinoma of the colon. Two cases of bilateral sacroiliitis were also diagnosed.

Conclusion: MRI is the diagnostic modality of choice for most disorders of the hip where radiographic findings are inconclusive. With MRI one can stage the pathology to prognosticate and influence therapeutic decisions.

Key words: Avascular necrosis, Hip pathology, Magnetic resonance imaging

INTRODUCTION

The development of cross-sectional and multiplanar musculoskeletal imaging techniques, particularly magnetic resonance imaging (MRI) has ushered in a new chapter in the clinical approach to hip pathologies. Modern MRI greatly contributes to the assessment of symptomatic hip joints and demonstrates preoperatively nearly every cause of symptomatic hip pathology.

Hip pain is a common clinical problem with a long list of possible etiologies. Hip pathologies in the setting of normal appearing radiograph and non-specific clinical history and examination findings can be a difficult diagnostic dilemma.

Trauma, infection, arthritis, avascular necrosis (AVN), tumors, and hip dysplasia can all manifest with extremely subtle radiographic abnormalities in the early stages. Currently, MRI is the modality of choice (following plain radiography) for imaging AVN, radiographically occult fractures, marrow replacement disorders, musculoskeletal neoplasms, and osteomyelitis involving the hip.

MRI is the most significant diagnostic test performed in the orthopedics and sports medicine patients. Frequently, it is the definitive examination providing invaluable information to help the surgeon not only to understand the underlying pathology but also to make the critical decision regarding surgical intervention.

Despite more than two decades of experience imaging the hip with MRI, its role as a diagnostic imaging modality in the patient with hip pain continues to evolve. Comprehensive studies involving large series of cases of pathologies involving the hip and their evaluation by MRI are few in the Indian literature. Most of the work has been in the form of isolated case reports. The present study emphasizes the role of MRI in the evaluation of hip pathologies.

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MATERIALS AND METHODS

The present cross-sectional study was carried out in a tertiary care institute from June 2014 to December 2015. The permission from the institute ethical committee was sought. All the cases with hip pathology attending Orthopedics OPD and consenting to participate were included in the study. All the consenting participants were subjected to MRI scan. Predesigned and pretested questionnaire was used to capture demographic and finding from MRI scan. The data were entered in Microsoft offices 2007 excel. The data were analyzed using Epi-info software. The continuous variable was summarized as mean and standard deviation while categorical variable as percentage and proportion.

RESULTS

The present study was conducted in 60 patients who underwent clinical, radiological, and pathological examination at a tertiary care institute. Age of patients ranged from 6 to 75 years. Maximum numbers of patients were in the age group of 30-50 years (36 cases - 60%). Male to female ratio was approximately 2:1. Distribution of the cases according to the age group is shown in Table 1.

Affection was unilateral in 26 cases (52%), whereas it was bilateral in 24 cases (48%). Plain radiographs were either normal or showed non-specific osteopenia or sclerosis. Abnormality was detected in 50 (83.3%) cases on MRI while 10 cases were normal. Fast spin echo (FSE) short T1 inversion recovery (STIR) images were most useful in delineating pathologies. Gadolinium-enhanced scans were used whenever necessary to evaluate the extent of the disease and the pattern of involvement.

AVN was the most common pathology detected comprising 25 of the 50 cases (50%). AVN was unilateral in 5 of the 25 cases (20%) and bilateral in 20 (80%) cases. The male to female ratio was 2.5:1. The possible etiological factors associated with AVN were steroids (7 cases), alcoholism (5 cases), trauma (2 cases), and sickle cell disease (1 case) while in 10 cases, no obvious cause could be found (Table 2).

The next most common abnormality detected was infective arthritis, found in 13 (21.6%) cases. It was mainly tuberculous in origin in most of the cases. In infective arthritis of the hip, MRI helps particularly in detecting soft tissue lesions which are not well seen on other modalities. There are some features that support discrimination between tuberculous arthritis and pyogenic arthritis such as the presence of bone erosion and absence of subchondral marrow signal intensity abnormality, favoring a diagnosis of tuberculous arthritis.

Table 1: Distribution of cases according to the age group

Age group (years)	Total cases (%)
<10	3 (6)
10-20	5 (10)
20-30	5 (10)
30-40	19 (38)
40-50	12 (24)
50-60	4 (8)
60-70	1 (2)
70-80	1 (2)
Total	60 (100)

Table 2: Various pathologies detected and their percentages in the studied population

Pathology	Number of cases (%)
No pathology	10 (16.6)
AVN	25 (41.6)
LCP disease	3 (5)
Infective lesions	13 (21.6)
Transient BMOS	2 (3.3)
Fracture of neck of femur	4 (6.6)
Sacroiliitis	2 (3.3)
Metastasis	1 (1.6)
Total	60 (100)

AVN: Avascular necrosis, LCP: Legg-Calvé-Perthes, BMOS: Bone marrow edema syndrome

Two cases of transient bone marrow edema syndrome (BMOS) were detected, in one case the involvement was bilateral, whereas unilateral in the other.

Three patients from the pediatric age group, who were sent for MRI, had Legg-Calvé-Perthes (LCP) disease. In cases of LCP disease, there was abnormal linear increase in the signal intensity at the junction of the epiphyseal cartilage and the ossification along with abnormalities in the contour of the cartilage was seen.

One patient diagnosed with carcinoma of the colon. MRI demonstrated metastatic focus involving neck, part of head and trochanteric region of the left femur. This was confirmed on biopsy.

Two cases of bilateral sacroiliitis were also diagnosed. Both were known cases of ankylosing spondylitis. Diagnosis of sacroiliitis was possible seen as loss of normal thin band of intermediate signal intensity representing cartilage on T1W images and erosions. Furthermore, conditions such as transient BMOS can be easily diagnosed.

Four cases of occult femoral neck fracture and one of fracture of femoral neck with AVN were detected using MRI. MRI is an effective method for evaluating occult fractures, non-displaced fractures, stress/insufficiency fractures, especially in the elderly and the osteopenic

patients where a delay in the diagnosis and therapy equates with higher morbidity.

DISCUSSION

With the lack of specificity in clinical examination and the imprecise result of conventional radiography and computed tomography (CT), MRI emerged as modality of choice in early diagnosis. The hip joint is a large and complex articulation and can be involved by numerous pathologic conditions. There are many modalities for the evaluation of hip pathologies such as ultrasound, bone scintigraphy, conventional radiography, conventional arthrography, CT scan, and MRI. Although radiographs remain the initial imaging technique, in most instances they detect the pathologies late, only when the bony changes are obvious.

In our study, both the bony and soft tissue structures about the hip joint were clearly visualized on T1W images while the pathologies were well demarcated on FSE TIR images. FSE STIR proved to be the most useful sequence, being able to detect presence or absence of abnormality in 100% of the cases. This is similar to what Khoury *et al.*¹ observed, who assessed the role of a limited MR protocol (coronal STIR) as the initial part of the MR examination in patients with hip pain and concluded that a normal coronal STIR study of the hips in patients with hip pain and normal radiographs precludes the need for further pelvic MR sequences.

In our study, pathologies were detected on MR examination in 83.3% of the total patients with hip pain, out of which, 54% were males and 28% were females. The most common abnormality detected in our study was AVN of the femoral head. In the present study, there were 25 cases of AVN of femoral head, out of which, 18 were males (72%) and 7 were females (28%). Thus, the gender ratio was approximately 2.5:1. Mitchell *et al.*² got a sex ratio of 1.43:1 and Beltran *et al.*³ got 1.7:1. Thus, in our study, we got a slightly higher sex ratio.

In our study, more cases were bilateral, which is consistent with the other previous studies. The most common causative association in the present study was the use of steroids which is consistent with the findings obtained by Mitchell *et al.*² and Beltran *et al.*³ The conversion of hematopoietic to fatty marrow is known to correlate with physiologic decreases in intramedullary blood flow and the risk of AVN. Of the 25 patients, <50 years of age with AVN, only 5 patients (24%) in the present study had predominantly hematopoietic intertrochanteric marrow which is in par with Mitchell

et al.,² who found hematopoietic intertrochanteric marrow in only 33% of cases. Focal defects involving the anterosuperior aspects of the femoral head were seen in 85% of cases in the present study. A line of low signal intensity surrounding the focal defects was seen in 95% of cases in the present study, whereas Mitchell *et al.*² (Radiology 1986) and Mitchell *et al.*⁴ (Radiology 1987) found it in 97% and 80% of the cases, respectively. A double line sign seen as an outer low signal intensity rim and an inner high-intensity band on T2W images was seen in 71% of cases which is consistent with the previous studies - Mitchell *et al.*² (Radiology 1986) and Mitchell *et al.*⁴ (Radiology 1987) found it in 80% and 71% of the cases, respectively. These data support the hypothesis that early non-traumatic osteonecrosis is associated with hyperemia and/or an increase in capillary permeability rather than acute devascularization and that diffuse marrow edema is the initial finding in early non-traumatic osteonecrosis.⁵

In our study evidence of osteomyelitis on MRI consisted of abnormalities of the bone marrow with decreased signal intensity on T1WI and increased signal intensity on T2W or STIR images as described in the previous studies by Unger *et al.*⁶

In our study, we found bone erosion to be much more common with tuberculous than with pyogenic arthritis. While no significant difference was obtained as regards the marrow signal abnormality which is contrary to the findings obtained by Hong *et al.*⁷

In our study, we detected four cases of occult femoral neck fracture which were seen as a circumferential hypointense signal in the neck with surrounding hyperintense signal on FSE STIR images. Initial radiographs were normal in both the cases. In both the cases, the fractures were identified on coronal images and sagittal images offered no increased advantage. Thus, we have reemphasized similar findings as quoted by Deutsch *et al.*⁸

In one case, there was abnormal linear increase in the signal intensity at the junction of the epiphyseal cartilage and the ossification as observed by Jaramillo *et al.*⁹ in 74% of their cases. One case of metastasis was detected on evaluation of painful hip and was seen as an ill-defined lesion which was hypointense on T1W and hyperintense on T2W images, involving neck, part of head and trochanteric region of the left femur. This was confirmed on biopsy. Bloem¹⁰ has described the features of the transient BMOS seen as ill-defined areas of decreased signal intensity of the bone marrow in the femoral head as compared to the normal marrow on T1WI and increase signal in the same areas on T2WI.

AQ4

CONCLUSION

MRI proved to be an excellent modality not only for the early diagnosis of osteonecrosis but also for the detection of infections as well as occult injuries, in and around the hip joint, with superior contrast resolution and without harmful radiation. MRI is the diagnostic modality of choice for most disorders of the hip where radiographic findings are inconclusive. With MRI one can stage the pathology to prognosticate and influence therapeutic decisions.

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Identification of *Leptospira* using Arbitrarily Primed Polymerase Chain Reaction

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Abstract

Introduction: Leptospirosis is a zoonanthropotic disease caused by the spirochaete, *Leptospira interrogans*, sometimes leading to multiorgan failure and death in humans.

Materials and Methods: A total of 45 leptospiral isolates from patients with leptospirosis, who attended the medicine department of the hospital in Kolenchery, during the period January 2000-June 2002 were stocked till the time of the study. Arbitrarily primed PCR was carried out using the primer PB - 1: 5'- GCG CTG GCT CAG - 3'.

Results: The DNA extracts gave bands at 23 kb region. In arbitrarily primed polymerase chain reaction, for most serovars, differentiating bands were observed between 200 and 1200 bp. The predominant serovar in the region was autumnalis (38%) followed by pyrogenes (16%).

Conclusion: A database with distinctive genetic patterns of pathogenic leptospires isolated from humans as well as animals of a particular region is necessary and should be taken up by reference laboratories since new patterns may crop up due to the inherent variability of the repetitive element.

Key words: AP-PCR, genotyping, leptospira, leptospira serovars

INTRODUCTION

Leptospirosis is a zoonanthropotic disease caused by the spirochaete, *Leptospira interrogans*, sometimes leading to multiorgan failure and death in humans. Identifying and characterizing the pathogenic serovars of leptospira still remain a daunting task for most leptospirologists. Methods of identification of *L. interrogans* serovars are very complex. Arbitrarily primed polymerase chain reaction (AP-PCR) which amplifies fragments of DNA of a few kb from a genome using a single primer produces distinct banding patterns which help in genotyping. In this study, leptospira isolates from clinical cases were characterized using AP-PCR, with a primer of 12 bp. Work with the same primer was carried out earlier by other workers.^{1,2}

Objective

As genomic variations occur between serovars of different geographical regions, there is a strong need for obtaining a database of local serovars. The study was aimed to genotype leptospira isolates from these regions.

MATERIALS AND METHODS

A total of 45 leptospiral isolates from patients with leptospirosis, who attended the medicine department of the hospital in Kolenchery, during the period January 2000-June 2002 were stocked till the time of the study. Preliminary serotyping by microscopic agglutination test (MAT) was carried out using antisera obtained from the WHO reference laboratory, Amsterdam following procedures mentioned in the guidelines.³

Standard Reference Strains used in the Study

The standard reference strains were obtained from the WHO Collaborating Centre for Reference and Research on Leptospirosis, Brisbane, and Queensland, Australia. Andamana (strain CH 11), australis (strain Ballico),

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autumnalis (strain Akiyami), ballum (strain Mus 127), bankinang (strain Bangkinang I) canicola (strain Hond Utrecht IV), carlos (strain C3) cynopteri (strain 3522C), grippotyphosa (strain Moskva V), hebdomadis (strain Hebdomadis), icterohemorrhagiae (strain RGA), jalna (strain Jalna), javanica (strain Veldrat Bat 46), mini (strain Sari), Pomona (strain Pomona), panama (strain CZ214K), ranarum (strain ICF), ramisi (strain Musa), sejroe (strain M84), and tarassovi (strain perepelicin).

Local Reference Serovars

Eight isolates identified earlier up to the strain level at the WHO reference laboratory, Amsterdam by serological tests were used for the purpose of referencing since these were the only local field isolates identified up to the strain level at a reference laboratory (referred here as “local reference serovars”).

DNA Extraction

The procedures for DNA extraction on all the strains were carried out as per the protocol mentioned by Ramadass *et al.*²

AP-PCR

Primer PB-1, 5'-GCG CTG GCT CAG-3' was used for AP-PCR analysis of all the leptospira stains isolated as well as for reference serovars. Each 50 µl of PCR mixture contained 2 µl of purified DNA extract, 0.3 µM primer, 250 µM of each dNTP, 3 mM MgCl₂, and 0.5 U of Taq DNA polymerase in 10 mM Tris. HCl (pH 9.0) and 50 mM KCl.

The rest of the procedures for AP-PCR were carried out as per the protocol mentioned in the publication.²

The patterns were compared with:

1. Standard reference serovars,
2. Local reference serovars, and
3. Previous publications employing AP-PCR with the same set of primer.^{1,2}

RESULTS

The DNA extracts gave bands at 23 kb region. In AP-PCR, for most serovars, differentiating bands were observed between 200 and 1200 bp (Figure 1).

The incidence of various isolates is given in Chart 1. The predominant serovar in the region was autumnalis (38%) followed by pyrogenes (16%).

DISCUSSION

Only few workers^{1,2} have reported the findings of AP-PCR using similar primer and conditions. Some of

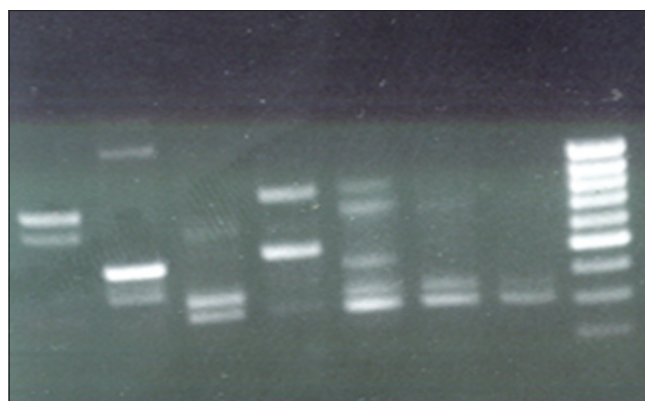


Figure 1: Patterns obtained using arbitrarily primed polymerase chain reaction of a few isolates. Standard reference serovars: Lanes: 1 - ballum, 2 - pomona, 3 - icterohemorrhagiae, 4 - CH 11. Isolates: Lanes: 5 - pyrogenes (local reference serovar), 6 - autumnalis, 7 - autumnalis, 8 - DNA marker

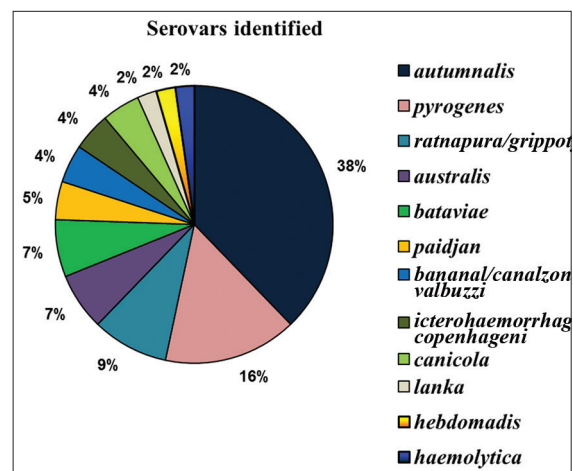


Chart 1: Serovars identified by arbitrarily primed polymerase chain reaction

the isolates gave patterns similar to those published earlier.^{1,2} However, patterns of icterohemorrhagiae, Lanka, ratnapura/grippyotyphosa did not match with any of the reference strains used in the study. Minor differences of one or more bands were observed in the case of some serovars of autumnalis. Two of the local reference serovars identified as serovar autumnalis strain Akiyami A at WHO Reference Centre, Amsterdam gave slightly varying patterns and were more in concurrence with the autumnalis isolates used in the study than with reference serovars. The patterns were more consistent with those of the local reference serovars indicating a strong need for in-laboratory standardization for identification purposes. Some patterns were difficult to identify. A good backup of the preliminary serogrouping with MAT helped to a great extent.

The results of the study showed that though PCR-based fingerprinting does facilitate characterization of pathogenic

leptospire unless the prevailing endemic serovars are primarily genotyped by AP-PCR, genomic characterization using this method becomes a very difficult task. Sometimes the bands are not poignant enough to visualize clearly and the comparison becomes difficult as minor differences may interfere with the identification. Variations may exist between reference strains and clinical or field specimens of the same serovar if they occupy different ecological niches.⁴ Moreover, profiles may be affected by the primer used, the quantity, and quality of the DNA template and the electrophoresis conditions and has to be applied with caution.⁵

Hence, it is not a stand-alone test and being technically demanding cannot be carried out routinely in most laboratories for identification purpose as it is difficult to standardize or generate data that can be exchanged digitally.^{6,7} There are reports of better discriminatory powers in typing leptospire using primers like M16⁸ compared to primers like PB-1 used in this study. Until better DNA-based identification tests are developed and validated, it will be better for clinical laboratories to retain the serological classification of pathogenic leptospire which though labor-intensive is easier for basic serogrouping.

CONCLUSION

A database with distinctive genetic patterns of pathogenic leptospire isolated from humans as well as animals of a particular region is necessary and should be taken up by reference laboratories since new patterns may crop up due to the inherent variability of the repetitive element.

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Screening of Pediatric Urinary Tract Infection using Modified Nitrite Test

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Abstract

Introduction: Pyrexia of unknown origin is a common diagnostic challenge for pediatricians. Quantitative culture of urine in laboratory takes time and treatment based on a positive culture may be delayed. There are frequent situations, in which decision about initiating therapy must be made earlier.

Aim: To study the diagnostic ability of modified nitrite test as a rapid screening test for diagnosing pediatric urinary tract infection (UTI).

Materials and Methods: A total of 300 children hospitalized in our pediatric ward requiring urine culture were included in our study. The efficacy of nitrite test and modified nitrite test to predict culture positivity was studied.

Results: Modified nitrite test was positive in 30 out of the 49 culture positive urine samples (sensitivity - 61.22%) as against the nitrite test which was positive in only 5 out of 49 culture positive samples (sensitivity - 10.2%). The specificity, positive predictive value, and negative predictive value were 98.8%, 90.91%, and 92.88%, respectively. The overall diagnostic accuracy was 92.67%.

Conclusion: Modified nitrite test was a more effective rapid screening test for diagnosing pediatric UTI.

Key words: Modified nitrite test, Nitrite test, Screening test, Urinary tract infection, Urine culture

INTRODUCTION

Fever is a common manifestation of various infectious diseases, which have a wide range of severity. Fever without localizing sign or symptom is a common diagnostic dilemma for clinicians caring for infants. Urinary tract infections (UTI) occur relatively frequent in infants and children. The major significance of UTI in children is the accompanying morbidity and the possible association with anatomic abnormalities (obstruction and vesico-ureteric reflux). This may lead to renal damage and progressive renal failure and may be amenable to medical therapy or surgical repair if detected early.¹ UTI can be reliably diagnosed only by culture and it is the gold

standard test. Many indirect tests have been proposed, but all have limitations.

Aim

The objective of this study is to evaluate the diagnostic ability of modified nitrite test as a rapid diagnostic screening test for diagnosis of pediatric UTI.

MATERIALS AND METHODS

Cross-sectional diagnostic study was done in an urban pediatric tertiary care hospital in Tamil Nadu, from 2009 to 2010. Ethics committee's approval and informed consent from the parents were obtained. 300 children in pediatric ward with various clinical diagnoses, requiring urine culture were studied. Patients who were already on antibiotic therapy were excluded from the study. Both male and female children were studied. Clearance for the study was obtained from the institution's ethical committee. Urine sample was obtained by clean catch mid-stream method in previously sterilized culture bottles. Parents were instructed regarding cleaning of the genitalia and proper collection of urine in sterile

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bottles. The time of the previous emptying of the bladder was noted. Time of collection of the urine specimen was also noted. Thus, the duration of the incubation period in the bladder was calculated. Urine samples were transported to the microbiology laboratory as quickly as possible and tested. Urine culture was prepared by the standardized loop method. 4 mm calibrated loop designed to deliver a known volume of 0.01 ml of urine was used. The urine sample was mixed thoroughly. The loop was inserted vertically into the urine to allow it to adhere to the loop. The loopful of urine was spread over the surface of the MacConkey agar plate. Incubation of the plate for at least 18 h at 37°C in the incubator was done. Colonies were counted on each plate. The number of colonies was multiplied by 100 to determine the number of micro-organisms per ml in the original sample. More than 1,00,000 (10^5) colonies per ml were taken as significant bacteriuria and considered culture positive.² Nitrite test was done by dipping the reagent strips in urine and result read after 1 min. Positive test is indicated by the presence of a red change. No color change indicates negative test. If the initial nitrite test was negative, 1 drop of 1% sodium nitrate solution was added to the urine (1 g of sodium nitrate dissolved in 100 ml of sterile water). This was incubated at 37°C in the incubator for 4 h. Nitrite test was again repeated and result interpreted as for nitrite test. The result of nitrite test modified nitrite test compared with urine culture report. The sensitivity, specificity, and predictive value of positive and negative test and accuracy of the test were statistically analyzed.

RESULTS

Of the 300 children included in the study, 147 were male and 153 were female. The age of the children varied from 2 months to 12 years. 49 of the 300 urine samples were culture positive. *Escherichia coli* was positive in 24 samples, *Klebsiella* in 23 samples, *Proteus* in 1 sample, and *Enterobacter* in 1 sample.

Nitrite test was positive in only 5 out of 49 culture positive urine samples with a sensitivity of 10.2%. There were no false-positive results (Table 1). Hence, the specificity and predictive value of positive test was 100%. The accuracy was low at 85.33%. Modified nitrite test (done by adding 1 drop of 1% sodium nitrate and further incubated at 37°C for 4 h) gave 33 positive results. Out of the 33 positive tests, 30 were true positive and 3 false positive (Table 2). The sensitivity was 61.22% with a high predictive value of the positive test (92.88%) and specificity (98.8%). The overall accuracy of the screening test was 92.67% (Table 3).

Out of the 24 *E. coli* positive urine samples, nitrite test was able to identify only 3 samples with 12.5% positive

Table 1: Cross-tabulation of nitrite test with urine culture test

Nitrite test	Urine culture		
	Positive	Negative	Total
Positive	5	0	5
Negative	44	251	295
Total	49	251	300

Table 2: Cross-tabulation of modified nitrite test with urine culture test

Modified nitrite test	Urine culture		
	Positive	Negative	Total
Positive	30	3	33
Negative	19	248	267
Total	49	251	300

Table 3: Comparison of results of nitrite test and modified nitrite test results

Parameter	(%)	
	Nitrite test	Modified nitrite test
Sensitivity	10.2	61.22
Specificity	100	98.8
Positive predictive value	100	90.91
Negative predictive value	85.08	92.88
Diagnostic accuracy	85.33	92.67

rate. Modified nitrite test was able to identify 15 out of the total 24 *E. coli* with positive rate of 62.5%. Similarly for *Klebsiella*, nitrite test was able to detect only 2 out of the total 23 culture positive with positive rate of 8.7%, whereas modified nitrite test was able to detect 14 out of the 23 *Klebsiella* culture positive with the positive rate of 60.86%.

DISCUSSION

Griess nitrite test is by far the most frequently studied and commonly used test for rapid diagnosis. Nitrite test in our study had a sensitivity of 10.2% and specificity of 100%. In previous studies, the statistical analysis of nitrite test varied greatly. Goldsmith and Campos study showed sensitivity and specificity for nitrite test as 21% and 99%, respectively.³ Tahirovic and Pasic study showed sensitivity and specificity of 21% and 80%, respectively.⁴ Robertson and Duff study gives 43% and 96% as sensitivity and specificity, respectively, for nitrite test.⁵ Most of the past studies were done in adult population. A longer incubation time in the bladder (4 h) is required for conversion of nitrate into nitrite. In the pediatric population, because of frequent bladder emptying, the duration urine stays in the bladder (incubation time) was found to be less.³ The mean incubation time of urine in the bladder for the whole study

was 3 h. However, the mean incubation time in nitrite test positive children was 5 h and 15 min. False-negative results in nitrite test were mostly due to frequent bladder emptying, diuresis, and lack of dietary nitrates. The observation that bacteria that reduces nitrate require incubation in urine for some hours was consistent with the finding that a higher yield of positive result was obtained from samples collected early in the morning or whose incubation time in the bladder was more than 4 h.⁶ Since in pediatric patients, it is difficult to measure dietary nitrate intake and prevent frequent bladder emptying, modified nitrite test is used. Even if the dietary nitrate is inadequate, bacteria in urine reduce nitrate added to the urine sample during the incubation time of 4 h. Nitrite test is then repeated. This modified method improved sensitivity considerably and especially useful in pediatric patients.³

CONCLUSION

Modified nitrite test showed good reliability in detecting the UTI in pediatrics. Modified nitrite test will be useful as

alternative to culture for screening in resource constraint settings. Early diagnosis of asymptomatic children is great importance in intervention can reduce the mortality and morbidity.

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Prevalence of Perceived Myths Regarding Oral Health and Oral Cancer-causing Habits in Kashmir, India

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Abstract

Background: Through years, dental professionals have faced many myths inculcated in the minds of patients which pass from one generation to another. In today's evolving environment of evidence-based dentistry, these anecdotal observations do not withstand scrutiny.

Aim: The aim of this study was to assess the prevalence of myths associated with dentistry and oral cancer-related habits among outpatients visiting different hospitals in Kashmir, India.

Materials and Methods: A cross-sectional study was carried out among the outpatients visiting 3 district hospitals of Kashmir, India. All the patients reporting to these hospitals; between the age group of 25 and 50 years, mentally sound, and those who were willing to participate were included in this questionnaire-based study. The study was carried out for a period of 3 weeks (1 week in each hospital) with 20-25 subjects per day, making a final sample of 520 subjects. A self-administered, pre-tested questionnaire was hand-delivered to the subjects and the duly filled questionnaire was collected on the same day from the respondents. The questionnaire consisted of 16 questions related to myths in dentistry in addition to the demographic data such as age, gender, and qualification of the respondents.

Results: Most of the respondents were found to be the strong believers of various myths irrespective of their qualification level.

Conclusion: The results of this study show that generally people believe in various myths in dentistry which results in poor oral health. This might be due to lack of knowledge and awareness about dental health and its importance.

Key words: Myths, Oral health, Teeth

INTRODUCTION

As is known to everyone, a myth is commonly held but a false belief, a misconception, or a fictitious or imaginary understanding of a thing or a person and has no relevance with reality. Innumerable myths are associated with many things and persons all around in the world. Myths breed on human's ignorance, superstitiousness, and imagination

about what he/she does not know. Reasons for harboring a myth vary from an individual's ignorance to a society's cultural, quasi-religious, educational, and overall setup. Myths being generally deep-rooted invariably form part and parcel of a society life for longer periods and often are very difficult to be separated apart; thus these inflict predominant effect on their attitude, behavior, and practice followed in a populace. This is a phenomenon of greater menace than that of sheer ignorance and thus calls for sustained, strenuous efforts needed to be undertaken for total awareness so as to inch ahead in the jungle of myths to uproot them out or otherwise, awareness about the facts with their positive result will continue to be the victim of myths thus harming the myth victims in multi-dimensional spectrum, thereby deteriorating our societies at large.

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This is true in every sphere of our life, but it is more prominent having far greater intrinsic importance in case of our health-care domain and, as such it is indispensably required to fully ward off the myths for the obvious reason of our health being the most important and prominent of our all priorities in the life of every individual.

The underlying cultural beliefs and practices influence the conditions of the teeth and mouth, through diet, care-seeking behavior, or use of home remedies.¹ Myths related to oral diseases and oral health-related practices are very common in Indian population. It is difficult to break this chain as it is deep-seated in the society and understanding them becomes essential to provide a good care. Hence, importance should be given for public health awareness regarding myths about oral health at the individual as well as community level.

As systems are becoming more complex and people's expectations of health care are rising dramatically, understanding the myths and misconceptions about oral diseases is important in providing excellent care and health education to both patients and healthy individuals. The high prevalence of these myths will prevent such population from attaining proper dental care even if it could be made available to them.² Hence, a questionnaire-based study was carried out among the outpatients in various hospitals of Kashmir, India.

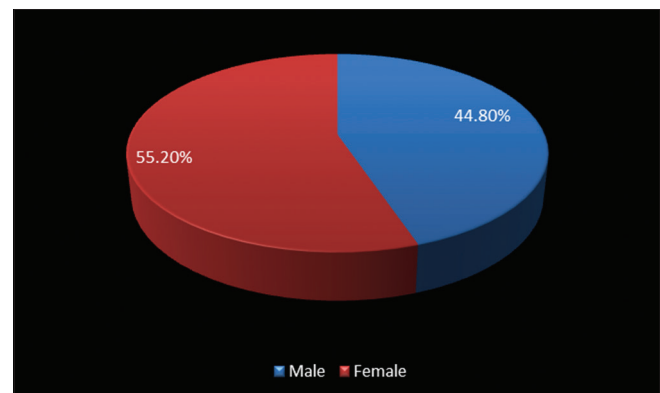
MATERIALS AND METHODS

A cross-sectional study was carried out among the outpatients visiting 3 district hospitals of Kashmir, namely, Government Gousia Hospital (Srinagar), District Hospital Pulwama, and Sub-District Hospital, Ganderbal. Ethical clearance was taken from the Directorate of Health Services, Kashmir. All the patients reporting to these hospitals between the age group of 25 and 50 years, mentally sound, and those who were willing to participate were included in this questionnaire-based study. The study was carried out for a period of 3 weeks (1 week in each hospital) with 20-25 subjects per day, making a final sample of 520 subjects. A self-administered, pre-tested questionnaire was hand-delivered to the subjects and the duly filled questionnaire was collected on the same day from the respondents. The questionnaire consisted of 16 close-ended questions related to myths in dentistry in addition to the demographic data such as age, gender, and qualification of the respondents. The identity of the persons participating in the study was kept anonymous. The questionnaire was designed based on the most commonly prevalent myths among the general

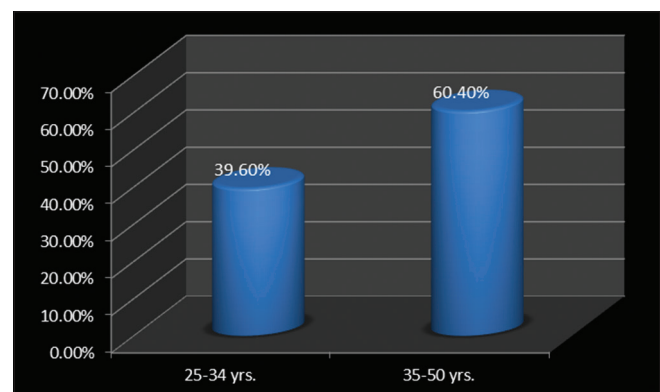
population. The Cronbach's alpha was used to assess the internal reliability of questionnaire which was found to be satisfactory. The questions were in English as well as in the local language (Kashmiri) for easy understanding. The collected data were subjected to statistical analysis.

RESULTS

A study was conducted for 3 weeks among 520 subjects who reported to the OPD of 3 district hospitals of Kashmir, namely, Government Gousia Hospital (Srinagar), District Hospital Pulwama, and Sub-District Hospital, Ganderbal, who voluntarily accepted to participate. Out of the total 520 subjects; 233 (44.8%) were male participants and 287 (55.2%) were female participants (Graph 1). The age range of subjects was between 25 and 50 years; with 206 participants (39.6%) of age 25-34 years and 314 participants (60.4%) of age 35-50 years (Graph 2). The educational qualification of the subjects ranged from illiterate to postgraduate (Graph 3). The frequency of subjects as per their responses for all the questions is shown in Table 1. For all the questions, the difference between the subjects saying "Yes" to those saying "No" was found to be statistically significant (Table 1).



Graph 1: Frequency of male and female subjects

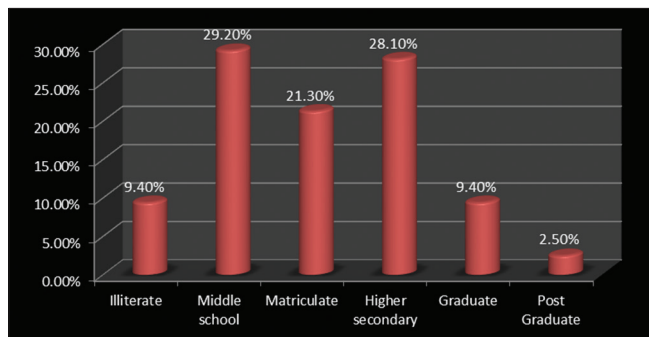


Graph 2: Frequency of subjects according to age group

Table 1: Frequency of subjects according to their responses to questionnaire

Questions	Yes (%)	No (%)	df	P value
Teeth get loosened if they are cleaned professionally by dentists	378 (72.7)	142 (27.3)	1	0.000*
Extraction of teeth under local anesthesia may cause impairment of patient's vision	383 (73.7)	137 (26.3)	1	0.000*
No treatment is required for milk teeth as they are going to fall anyway	334 (64.2)	186 (35.8)	1	0.000*
Tooth decay cannot be treated as it is a hereditary disease	133 (25.6)	387 (74.4)	1	0.000*
Oral health is related to general health	215 (41.3)	305 (58.7)	1	0.000*
Teeth can be cleaned at home using tree sticks (neem, etc.), coal, and brick powder rather than toothpaste	224 (43.1)	296 (56.9)	1	0.002*
We should stop brushing teeth if our gums are bleeding	320 (61.5)	200 (38.5)	1	0.000*
We should visit dentist only during pain and not for routine checkups	313 (60.2)	207 (39.8)	1	0.000*
Placing clove in the decayed tooth is more than enough to relieve tooth pain	391 (75.2)	129 (24.8)	1	0.000*
Toothache is caused due to punishment from God for one's sins	194 (37.3)	326 (62.7)	1	0.000*
Teething causes fever, loose motions, etc.	331 (63.7)	189 (36.3)	1	0.000*
It is better to go for extraction of a tooth rather than other treatments such as restoration and RCT	310 (59.6)	210 (40.4)	1	0.000*
Good oral health can be achieved by chewing tobacco	296 (56.9)	224 (43.1)	1	0.000*
I will not be a victim of oral cancer as my friend, who smokes more than me, is healthy	331 (63.7)	189 (36.3)	1	0.000*
Smoking can be replaced safely by smokeless tobacco	329 (63.3)	191 (36.7)	1	0.000*
A child does not need cleaning of milk teeth	407 (78.3)	113 (21.7)	1	0.000*

*Significance at $P < 0.05$. RCT: Root canal therapy

**Graph 3: Distribution of subjects according to qualification**

DISCUSSION

Myth is a belief among people which has no relevance with reality. Myths exist due to a variety of reasons such as lack of knowledge and awareness, cultural beliefs, and social fallacy. They are usually passed on from one generation to the next. It is difficult to break this chain as it is deep rooted in the society. Change is to be made in the attitude, thinking, and behavior of the people to eliminate the myths which is possible only after understanding these myths and misconceptions so that good care as well as health education is provided to the people at both; the individual as well as at community level.

In today's evolving environment of evidence-based medicine and dentistry, these unreliable observations do not withstand scrutiny. Especially, a developing country like India faces many challenges in rendering oral health care needs. Myths are part and parcel of everyone's lives. However, one has to be aware of some of the myths that are floating around on issues related to health that includes dental health because it could result in dangerous

consequences if followed without understanding the principles behind it. There are many dental myths, some are child related, some of them are adult related, and the rest are superstitious.³

India has a low budget to meet the general populations' oral health treatment needs, a high disease burden and a low literacy rate. All these factors predispose the general population to poor oral healthcare, false treatment need assumptions, and false beliefs.⁴

In the present study, 72.7% of the respondents believed that teeth get loosened if they are cleaned professionally by dentists. This response may be due to the fact that the calculus would have been filling the gaps, masking the mobility, preventing the exposure of dentin for its sensitivity; and only after removal of calculus by ultrasonic scaling, the patients have an erroneous feeling of loose teeth. This response was in accordance with previous studies wherein many respondents believed that professional scaling leads to sensitivity, mobility, and also creates gap in-between them.^{5,6} Nearly 73.7% of the subjects thought that extraction of teeth under local anesthesia may cause impairment of patient's vision. This kind of misconception is inherited due to false exaggerated information promulgated by those who had previous personal negative dental experiences.⁷ This might be attributed to lack of awareness, low educational levels, anxiety, apprehension, and myths about dental treatment entrenched in their minds.⁸ The fact being that there is no relation of vision with tooth extraction. The result is a contrast to the study done by Saravanan and Thirineervannan where only 20% believed in the myth.⁹ Around 59% of the respondents did not agree that oral health is related to general health. This finding was in

accordance with the previous study conducted in Bareilly, India.⁴ It is contrary to what was being proposed by the World Health Organization who have mentioned that the masses should be made aware of the relationship between oral health and general health.¹⁰ In the present study, around 57% of the respondents preferred using tree sticks, coal, and brick powder whereas 43.1% were using toothpaste for cleaning teeth. The disadvantages include gingival trauma and occlusal wear, but extracts of many sticks have yielded potent antimicrobial and antiplaque substances. Charcoal powder is coarse and it could abrade the enamel and damage the periodontal ligament.^{4,11} Majority (63.7%) of the subjects believed that they would not fall victim to oral cancer as people who smoke more than them were still healthy. This is because that the general population still follows the belief that if nothing happens to their close ones, it does not happen to them either. This shows their ignorance regarding the susceptibility of different individuals and unaware that most relatives of patients with oral cancers are at the same risk for cancer as the general population.⁵ A high percentage (64.2%) of respondents believed that milk teeth need no treatment/care as they are going to fall anyway. The most widely believed myths about oral health in India are milk teeth need not be cared for because they last only for a few years and these teeth will anyway be replaced by permanent teeth.² This is not entirely true as early loss of milk teeth will interfere with chewing and affect the child's nutrition, leads to drifting of the adjacent teeth and closure of some of the space that is required for the succeeding permanent teeth to erupt into. Such a loss of space will cause the permanent teeth to erupt in irregular position and result in crowding. Therefore, milk teeth need to be cared for as much as permanent teeth. Hence, it is sensible to clean the infant's teeth soon after they appear in the mouth. In fact, the child's gum pads should be cleaned everyday by gentle massage even before the teeth erupt.¹²

Majority (63.7%) of the respondents believed that teething causes fever and loose motions. This finding was similar to the results of previous studies wherein majority of the parents had false beliefs or myths regarding the signs and symptoms of teething such as fever and diarrhea.^{13,14} The fact is that poor personal and environmental hygiene practices can contribute to the incidence of diarrhea in children, and it can be life-threatening if not promptly attended to. Around 64% of the subjects believed that smoking can be replaced safely by smokeless tobacco. Quite a number of respondents believed that smokeless tobacco can be less harmful and a better alternative to smoking. The people are unaware of the increased ill effects of smokeless tobacco; overall nicotine exposure is higher than that achieved by cigarette smoking^{15,16} and it can be assumed that smokeless tobacco is less harmful may be

because of the traditional use of beetle nut in many Indian communities. Many respondents thought that good oral health can be achieved by chewing tobacco. This belief is still prevalent in villages and among deprived people who expect a cleaner oral cavity after chewing tobacco being unaware of its harmful ill effects leading to abrasion.¹⁷

CONCLUSION

It was concluded that majority of the respondents believe in various myths associated to dentistry and oral cancer-related habits. Hence, it becomes the role of public health dentist as well as all the dental surgeons (specialized/general) to counsel the people about the consequences of adhering to such myths.

RECOMMENDATIONS

1. Comprehensive public health awareness, particularly about the myths related to oral diseases, their preventions, and treatment is imperatively to be assured at individual as well as community level.
2. For effective and long-lasting prevention of the disease, coordinated efforts among the dentists, public health specialists, social workers, and NGOs have to be indispensably taken such that proper education forms an integral part of the related development programs.
3. There is no substitute to the best evidence-based dentistry needed to dispel the myths which advances the use of research evidence effectively in dental practice and improves the dental health professionals' knowledge regarding patient counseling and aids in clearing misconceptions toward various oral health issues.
4. A dental professional needs to educate the patient so inclusively and in proximity with his (patient's) thinking such that no reservation is left with the latter to open his/her mind with all its hazes to the dentist and thus misconceptions are easily and fully rectified at the chairside.
5. Approaching the public with simple worded but precise pamphlets is a very effective tool for health education to the masses regarding the myths and dispelling them with facts.

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Comparative Analysis of Results of Primary Bipolar Arthroplasty versus Proximal Femoral Nail Antirotation: A Prospective Study

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Abstract

Introduction: Comminuted peritrochanteric fracture commonly occurs in older age group. Commonly used methods are dynamic hip screw and proximal femoral nail. However, they are associated with complication and chance of failure is high. Primary bipolar arthroplasty is now emerging as a new modality of treatment. Our study compares the result of internal fixation with primary bipolar arthroplasty in the unstable trochanteric fracture.

Materials and Methods: This institution-based, prospective longitudinal study was conducted in our institution between January 2011 and March 2016. The inclusion criteria were: Unstable intertrochanteric severe osteoporosis. The exclusion criteria were: Suspected pathological fracture, significant senile dementia, and osteoarthritis or rheumatoid arthritis in the fractured hip and polytrauma. The final results were evaluated Parker and Postel Merle d'Aubigné (PMA) scores.

Results: A total 130 patients were included in the study. The differences between the two groups in operation time, blood loss, and transfusion volume were significant ($P < 0.05$). We found clinical results were significantly in favor of arthroplasty in terms of final Parker score, overall PMA score, and all three PMA items. Our observation that mortality was independent of surgical technique (21.7% nailing and 21.4% arthroplasty), time to surgery, and fracture type.

Discussion: Overall; the incidence of fixation failure in osteoporotic hip fractures is 5% in peritrochanteric fractures. In general, failed internal fixation leads to prolonged hospital stay, a doubling of healthcare costs, increase in social dependency. Our study underlined that arthroplasty was not associated with greater post-operative mortality than osteosynthesis and that the general complications rate was similar between the two groups (21.7% in nailing versus 21.4% in arthroplasty).

Conclusion: Primary bipolar arthroplasty is a good alternative to fixation. Overall, rigorously conducted prospective random clinical trials with larger population and long-term follow-up are needed.

Key words: Arthroplasty, Nail, Trochanteric fracture

INTRODUCTION

Proximal femoral fractures constitute 30% of all fractures referred to hospitals for treatment. Among them, the intertrochanteric fracture was seen in the extreme of ages. As the life expectancy of the population is increasing, the proportion of patients with postmenopausal or senile

osteoporosis is increasing simultaneously. Therefore, the number of proximal femoral fractures requiring urgent treatment is growing accordingly. In the age category of 50 years and older, the incidence of these fractures has increased exponentially.

The standard treatment, commonly accepted, is osteosynthesis. Its objective is to have a stable fixation and early mobilization. The prognosis of this fracture is poor, due to the presence of numerous comorbidities, prolonged immobilization, and noncompliance to rehabilitation therapy. The indication for prosthetic replacement in this type of fractures already exists in the literature as rescue intervention in failed osteosynthesis.

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The principal of treatment is based on whether the fracture is stable or unstable. This can change the therapeutic approach to surgery. The two main classifications are used worldwide to determine whether a fracture can be considered stable or not: AO/ASIF classification and Evans classification. According to the AO classification, Type 31-A1 and Evans classifications Types I and II are considered stable as they are two-part fracture. These types of fractures already have an absolute indication of osteosynthesis in the form of a dynamic hip screw or intramedullary nail that is accepted by all surgeons.

The AO/ASIF considers unstable fractures the multifragmentary intertrochanteric fractures or 31-A2 and the intertrochanteric ones or 31-A3 - type, while the Evans classification, which assesses the lack of medial and posterolateral support, or both, considers unstable fractures the III, IV, and V types. The treatment of unstable intertrochanteric fractures in the elderly patient is still controversial because often this type of fractures are comminuted, patients are elderly with marked osteoporosis, and it is very difficult to obtain a stable synthesis and a good reduction of the fracture.¹

Hemiarthroplasty has been used for unstable intertrochanteric fractures since 1971,² however, less frequently as compared to femoral neck fractures.³ Its initial use was as a salvage procedure for failed pinning or other complications.⁴ Grimsrud *et al.* performed 39 consecutive cemented bipolar hip arthroplasty in unstable intertrochanteric fractures. He used a standard femoral stem and reconstructed the trochanter by cerclage cabling. This technique allowed safe and early weight bearing on the injured hip and had a relatively low rate of complications.⁵ Rodop *et al.* performed primary bipolar hemiprosthesis for unstable intertrochanteric fractures in 37 elderly patients. According to Harris hip-scoring system, 17 excellent (45%) and 14 good (37%) results were found after 12 months.⁶

In this prospective study, we compare the results of primary bipolar arthroplasty and proximal femoral nail antirotation (PFNA) in unstable trochanteric fractures.

MATERIALS AND METHODS

This was an institution-based, prospective longitudinal study. The study was conducted in our institution after getting ethical permission. All the patients with intertrochanteric fractures admitted to the hospital between January 2011 and March 2016 were evaluated. All the patients were counseled about the advantages, disadvantages, and complications of the procedure. After getting written consent from patients, they were

selected for the study. We used Singh's classification of the trabecular bone structure in the proximal femur as a measure of osteoporosis based on the anteroposterior (AP) radiograph of the contralateral hip. The inclusion criteria were: Unstable intertrochanteric fractures (three or more part intertrochanteric fractures with a loss of posteromedial cortical buttress and reverse obliquity fractures, AO/ASIF classification 31-A2 and - A3), age over 70 years, severe osteoporosis (Singh index ≤ 3), no contraindication to anesthesia (American Society of Anesthesiologists [ASA] score of 1-4), and pre-injury independent walking with or without aids. The exclusion criteria were: Suspected pathological fracture, significant senile dementia, and osteoarthritis or rheumatoid arthritis in the fractured hip poor ambulation before the trauma, polytrauma, and severe concomitant medical conditions (ASA-5). The patients underwent surgery 4-10 days (mean, 6 days) after admission.

All cases of bipolar arthroplasty were operated using a standard posterior approach in lateral decubitus position. The principal was to the removal of femoral head, reconstruction of calcar and greater trochanter with the femoral shaft. Removal of femoral head is really difficult in trochanteric fracture as the capsule was attached to proximal fragment. In general, two methods were used according to fracture pattern. A proximal neck cut at the subcapital level was done and removed the head like in fracture neck femur or by releasing the whole capsule by rotating the proximal fragment with the help of corkscrew (Figure 1). With the removal of the head, the fracture now had three main fragments, namely, the greater trochanter, the lesser trochanter, and the shaft. Reconstruction of calcar was done by fixing lesser trochanter with the shaft. If lesser trochanter was comminuted, it was reconstructed with wedge shape graft taken from the head fragment. In case of the greater trochanter was the fracture en masse, it was reattached to the main shaft using steel wires. In cases where the greater trochanter was coronally split a tension band was applied beneath the gluteus medius and attached to the shaft. If the greater trochanter was found to be severely comminuted; ethibond sutures were used to suture together the trochanter pieces and the soft tissue to make a stable construct. Thus, at the end of reconstruction, the greater trochanter, the lesser trochanter, and the shaft were wired together using steel wires. The femoral canal was broached with appropriate anteversion (Figure 2). Trail reduction was done with the broach *in situ* and neck size was measured second-generation cementing technique and cement restrictor were used in all cases. Once the prosthesis was fixed, the broken trochanter and calcar were again retightened by tensioning the wire cables (Figures 3 and 4).

All cases of PFNA were operated in supine position on the fracture table. Traction was applied first in the direction



Figure 1: Removal of femoral head



Figure 2: Broaching of femoral canal in proper anteversion

of the length of the extremity to reduce the fracture. This would distract the fragments and restore length. The second step was internal rotation. Each step was checked with the image intensifier. The entry point was usually on the lateral aspect of the greater trochanter. Skin incision was given in line with the femoral shaft axis and about 5 cm proximal to the tip of the trochanter. Guidewire was inserted into the femoral shaft, and its position was checked using the image intensifier. In most patients, the nail was inserted manually over the guidewire. The nail was inserted to such a depth that it would allow the column screw to be placed through the middle of the femoral neck. Insert the femoral neck screw over the guide wire under image intensification that the femoral neck screw protrudes slightly over the lateral cortex. The neck screw had to be locked and was verified intraoperatively. The distal screws were inserted thereafter (Figure 5).

Patients were examined postoperatively at 6 weeks, 3 months, 6 months, 1 year, and thereafter annually. At each follow-up visit, a clinicoradiological examination was done, and the patient was evaluated using Parker and Postel Merle d'Aubigné (PMA) scores. AP radiographs of the hip were analyzed at each follow-up to note evidence

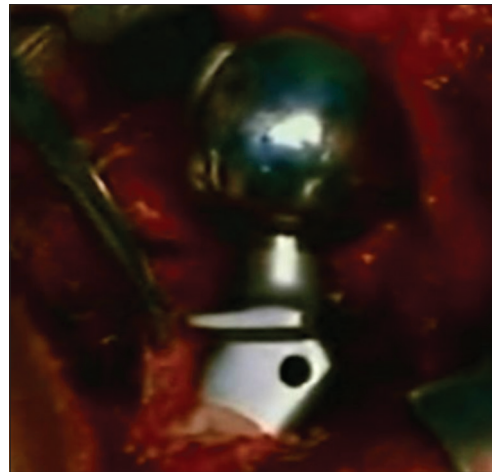


Figure 3: Prosthesis *in situ*

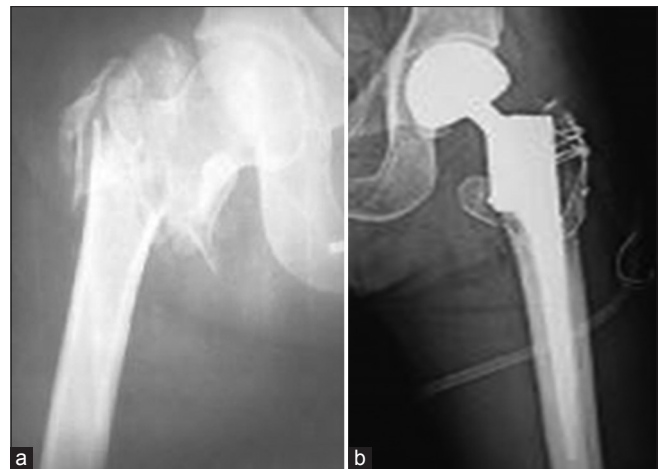


Figure 4: (a) Pre-operative X-ray, (b) post-operative X-ray

of loosening or screw cut out. Quantitative data were analyzed by Wilcoxon/Kruskal-Wallis test to compare means and Levene test to compare scatter; qualitative data were analyzed by Chi-square test. The significance threshold was set at 0.05.

RESULTS

A total 130 patients were included in the study from January 2011 to March 2016. Bipolar arthroplasty was done in 70 patients, and internal fixation in the form of the proximal femoral nail was done in 60 cases.

The demographic characteristics of the 130 patients are summarized in (Table 1). The bipolar arthroplasty group included 38 males and 32 females with a mean age of 77.02 ± 7.58 years (range 70-80 years), and the internal fixation group included 29 males and 31 females with a mean age of 72.05 ± 5.8 years (range 71-85 years). Most patients had comorbidities that could adversely affect the functional outcomes, such as cardiovascular problems,

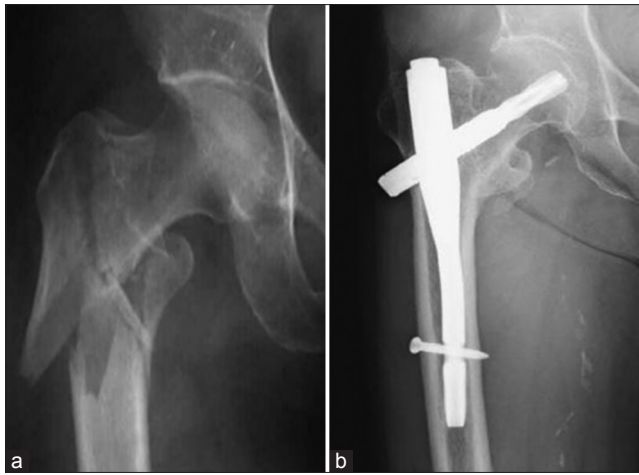


Figure 5: (a) Pre-operative X-ray, (b) post-operative X-ray of proximal femoral nail antirotation

diabetes mellitus, pulmonary diseases, and other associated diseases, but there was no significant difference in the number of comorbidities between the two groups. The data including age, sex, body mass index, fracture type, and Singh index of patients in the two groups also showed no significant difference.

The detailed surgery information of the patients is given in (Table 2). The mean operation time in the bipolar arthroplasty group was 74.5 min, much longer than 53.4 min in the internal fixation group. The average blood loss of the bipolar arthroplasty patients was 475.3 ml in comparison to two times of the blood loss of 252.8 ml of the internal fixation patients, and the average blood transfusion volume in the arthroplasty group was even more than two times that in the other groups. The differences between the two groups in operation time, blood loss, and transfusion volume were significant ($P < 0.05$). It can be also seen that although the patients stayed in the hospital for the similar length of duration.

At 12 months follow-up, we found that 13 of the 60 osteosynthesis patients had died (21.7%). Among the rest 47 patients, general complications were noted in 10 patients (21.3%). These include one thromboembolism, three cardiorespiratory, four neurological complications, and two infections. Surgical complications were found in eight patients (13.3%). These patients required revision surgery. Among them, six patients were managed by revision arthroplasty. At 1 year follow-up, the mean Parker score was 4.3 points range 0-9, mean PMA score 11.6 range 3-18, mean pain score 4.4, motion 4.46, and gait score 2.7, respectively. The average time of allowing weight-bearing was 13.8 days, and the mean time of effective weight bearing was at 28.6 days. The average time of recovery of walking distance at 46 days; and free gait without cane was at a mean 96 days (median 90 days).

Table 1: Comparison of demographic characteristics of patients

Parameters	Bipolar arthroplasty (70)	Internal fixation (60)	P value
Gender: Male/female	38/32	29/31	0.46
Age (years): Mean (range)	77.02±7.58	72.05±5.8	<0.05
Side: Right/left	32/38	28/32	0.95
Mechanism of injury			
Simple fall at home	57	44	0.39
Traffic accident	13	16	
BMI	22.3±4.7	25.1±5.2	<0.001
Singh index	2.9±0.7	25.1±5.2	<0.001
Associated comorbidities	38	37	0.67
Cardiac	21	20	
Vascular	20	19	
Pneumological	6	7	
Renal	6	6	
Neurological	10	9	
Associated contralateral osteoarthritis of the hip	6	5	
Associated osteoarthritis of the knee (s)	14		
AO fracture classification			
A2	38	34	0.85
A3	32	26	
Mean pre-operative Parker score	5.5	5.9	<0.05

Table 2: Comparison surgical details of both groups

Parameters	Bipolar arthroplasty (70)	Internal fixation (60)	P value
Operation time (minute)	74.5±15.2	53.4±12.5	<0.001
Blood loss (ml)	482.3±132.4	262.8±92.6	<0.001
Blood transfusion volume (unit)	3.7±1.3	1.8±0.9	<0.001
Hospitalization (days)	18.6±4.7	18.3±5.3	0.615

At 12 months follow-up, we found that 15 of the 70 arthroplasty patients had died (21.4%). Among the rest 55, there were seven general complications. These include three neurological, three cardiorespiratory, and one venous thrombosis. The local complications included one dislocation (2.2%) and one sepsis for total 4.4% cases of surgical revision (Table 3). At 1 year follow-up, the mean Parker score was 5.1 points range 0-9, mean PMA score 13.9 points range 4-18, mean pain score 5.2, motion 5, and gait score 3.6, respectively. The average time of mean effective weight-bearing was at 11.1 days and recovery of walking distance at 21 days. The recovery of free gait without cane was at a mean 117 days (median, 90 days).

Thus, we found that clinical results were significantly in favor of arthroplasty in terms of final Parker score, overall PMA score, and all three PMA items (Table 4).

At 12 months follow-up, 28 patients in all had died. Two patients died within 10 days postoperatively, 15 between

Table 3: Comparison of complications of both groups

Parameters(%)	Arthroplasty (70)	Nail (60)	P
Complications	9 (22.5)	16 (22.2)	0.973
Dislocation	3 (7.5)	0 (0)	0.018
Revision operation	2 (5.0)	3 (4.2)	0.838
Mortality	11 (27.5)	19 (26.3)	0.899

Table 4: Comparison of final results of both groups

Parameters	Nail (60)	Arthroplasty (70)	Wilcoxon test	Levene test
Mean postop Parker	4.3	5.10	0.02570	0.0632
Mean postel Merle	11.6	13.9	<0.0010	0.006
Pain score	4.4	5.2	<0.0001	<0.0001
Motion score	4.46	5	<0.0049	<0.001
Gait score	2.7	3.6	0.00050	0.092

days 10 and 90, and 11 later than day 90. We found that deceased patients had significantly greater mean age (87.4 vs. 85.3 years; $P = 0.002$), lower pre-operative Parker score (4.7 vs. 6; $P = 0.0005$), and a higher rate of renal comorbidity. Our observation that mortality was independent of surgical technique (21.7% nailing and 21.4% arthroplasty), time to surgery and fracture type, but correlated with general complication rate ($P = 0.03$) and post-operative sepsis ($P = 0.05$).

DISCUSSION

Fracture of proximal femur with their well-documented impact on morbidity and mortality, probably represent the most devastating outcome of osteoporosis in the elderly. As our population becomes increasingly older and the incidence of hip fractures continues to rise, even low failure rates will constitute a major challenge to health care systems. Internal fixation has drastically reduced the mortality associated with intertrochanteric fractures.⁷ However, early mobilization is still avoided in cases with comminution, osteoporosis, or poor screw fixation.^{8,9} Overall, the incidence of fixation failure in osteoporotic hip fractures is 5% in peritrochanteric fractures. In general, failed internal fixation leads to prolonged hospital stay, a doubling of healthcare costs, increase in social dependency. Furthermore, the marked disability and reduction in quality of life evident before salvage procedures may persist at long-term follow-up. Despite this, however, no clear link between revision surgery and an increase in mortality has been demonstrated in the literature. In view of these findings, of particular relevance then is the discussion between IF and arthroplasty in the management of osteoporotic fractures of the hip.

The earliest comparison of internal fixation and hemiarthroplasty was done by Haentjens showing a significant reduction in the incidence of pneumonia and pressure sores in those undergoing prosthetic replacement.¹⁰ In a comparative study of hemiarthroplasty versus internal fixation, Kayali 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.¹¹ Broos *et al.*³⁶ concluded that the operative time, blood loss, and mortality rates were comparable between the two groups, with a slightly higher percentage (73% vs. 63%) of those receiving prosthesis.¹² The functional outcome was comparable between both groups. Stappaerts found no difference between two groups except a higher transfusion need in the replacement group.¹³ In our series, the average blood loss was 475.3 ml in comparison to 252.8 ml in fixation group. There was no incidence of dislocation. The present study showed better results with arthroplasty than with nailing in unstable trochanteric fracture in over 75 year olds, in terms both of associated complications (2.8% vs. 12.5%) and of Parker and PMA functional scores (Table 4).

Conflicting reports about post-operative mortality in cases with primary hemiarthroplasty are cited in the literature. Kesmezacar *et al.* reported post-operative mortality in 34.2% after a mean of 13 months and in 48.8% after a mean of 6 months in patients treated with internal fixation and endoprosthesis, respectively.¹⁴ Our study underlined that arthroplasty was not associated with greater post-operative mortality than osteosynthesis and that the general complications rate was similar between the two groups (21.7% in nailing vs. 21.4% in arthroplasty).

One major technical problem in trochanteric fracture arthroplasty is to restore lower-limb length.⁶ In unstable and therefore, complex fracture (31 A2.2 and 3, and 31 A3.3), the usual anatomic landmarks are disturbed (fracture of the lesser trochanter, pulled forward by the psoas tendon; fracture of the greater trochanter, pulled forward by the medial gluteal tendon) so that rigorous pre- and per-operative planning is mandatory to avoid discrepancy, which is badly accepted by active subjects (Parker 8 or 9).

Another problem is the primary stability of the prosthetic stem, lacking metaphyseal support in case of fracture, and possibly also lacking diaphyseal support in case of osteoporosis or of the uncemented implant. In the present series, all the implants were cemented. There was no varus collapse and dislocation in our study.

The Cochrane database analysis of relevant studies concluded that there is insufficient evidence to prove that primary arthroplasty has any advantage over internal

fixation.³ However, they also mentioned that there were only two randomized trials studied and both had methodological limitations, including an inadequate assessment of the longer term outcome. Delay in surgery is an important predictor for mortality in patients with proximal femur fracture and also of the post-operative morbidity.^{15,16} We in our study, however, could not comment on these points because of small sample size. Further, inhomogeneous population in terms of existing co-morbidity and retrospective nature of our study are the other limitations.

CONCLUSION

Thus, in conclusion, primary hemiarthroplasty does provide a stable, pain-free, and mobile joint with acceptable complication rate as seen in our study; however, a larger prospective randomized study comparing the use of intramedullary devices against primary hemiarthroplasty for unstable osteoporotic fractures will be needed.

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Pathological Profile of Exudative Pleural Effusion using Pleural Biopsy by Abram's Needle: A Hospital-based Observational Study

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Abstract

Introduction: Pleural effusion is one of the common lung disorders in medical practice. Nearly 10 lakh individuals are reported to develop pleural effusion globally every year, and the etiology of pleural effusion varies widely from one community to the other. The objective of the present study is to assess the etiology of exudative pleural effusions, using pleural biopsy by Abram's needle.

Materials and Methods: The study is a hospital-based prospective observational study undertaken in the Department of Pulmonary Medicine at S.V.S Medical College, Mahabubnagar, Telangana, India, from October 2013 to October 2015. Pleural tissue taken by the Abram's biopsy needle and sent for histopathology examination.

Results and Conclusions: A total of 100 participants were included in the final analysis. The most common cause was tuberculosis (TB) (58%) followed by chronic inflammation of non-specific origin (30%) and malignancy (12%) of whom equal proportion (5%) of them had adenocarcinoma and squamous cell carcinoma. There was no statistically significant association between age, gender, and TB. There was statistically highly significant ($P < 0.001$) association between malignancy and increased age. However, there was no significant association ($P = 0.85$) between gender and malignancy.

Key words: Abram's needle, Exudative effusion, Pleural Biopsy

INTRODUCTION

Pleural effusion is one of the common lung disorders in medical practice. Nearly 10 lakh individuals are reported to develop pleural effusion globally every year.¹ The etiology of pleural effusion varies widely from one community to the other, frequently being a complication of an underlying illness. Commonly exudative pleural effusions of infective origin are observed in young patients while among elderly it is due to malignancy.² However, even after thorough investigations, identifying the exact cause for effective

management of the case can be often challenging for the pulmonologist.

The incidence of tuberculosis (TB) in a given region seems to influence the occurrence of pleural effusion more frequently. Valdes *et al.* have reported that in areas of high TB incidence, the most frequent cause of pleural effusion is TB (25%), followed by malignancy (23%), congestive cardiac failure (18%), and pneumonia in 14% of the cases.³ In a retrospective study by Ngoh, among 100 cases of pleural effusion, TB accounted for 49 cases, malignancy for 43 cases, and exudative pleural effusion accounted for most (94%) of the cases.⁴

Mycobacterium TB affects nearly one-third of world's population,⁵ and pleural TB is found to be the common extrapulmonary TB, especially in HIV/AIDS patients.⁶ The histological and/or microbiological examination of TB pleuritis, the gold standard test^{7,8} of confirmation requires

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the pleural tissue extraction. Although such tissue can be obtained by thoracoscopy, open surgical procedures or closed biopsy.^{7,8} The former two seem to be limited in the commonplace and the latter is, therefore, a sought after initial investigation across the world.

Various types of closed pleural biopsy needles are available since their introduction during the 1950s that comprise Abrams, Cope, and Vim-Silverman needles among others.⁹⁻¹¹ Studies have consistently shown that among these types, the Abram's needle owing to its high yield is the most commonly used one.^{12,13} Hence, the objective of the present study is to assess the etiology of exudative pleural effusions, using pleural biopsy using Abram's needle.

Objectives

1. To study the etiology of exudative pleural effusions, using pleural biopsy, presenting to a tertiary care hospital.

MATERIALS AND METHODS

Study Design

The study is a hospital-based prospective observational study.

Study Setting

The study was undertaken in the Department of Pulmonary Medicine at S.V.S Medical College, Mahabubnagar, Telangana, India.

Study Duration

The study was conducted from October 2013 to October 2015.

Study Population

Patients presenting to the study setting, with exudative pleural effusion.

Inclusion Criteria

- Age above 11 years
- Moderate (25-75% of hemithorax) and massive (>75% of the hemithorax) pleural effusions had been taken into the study by clinical, radiological examination, and by pleural fluid analysis.

Exclusion Criteria

- Patients with bleeding disorders
- Patients with local skin infections
- Patients with very low platelet count
- Pleural effusions secondary to well documented the chronic history of heart failure, Eritinis syndrome, cirrhosis of liver, and other transudate pleural effusions.

Sample Size and Sampling Methods

A total of 100 subjects were recruited sequentially into the study after screening for compliance with inclusion and exclusion criteria, hence no sampling was done.

Ethical Issues

Approval of the Institute Human Ethics Committee was obtained. Informed written consent was obtained from all the participants after explaining the objectives of the study, risks, and benefits involved. The personal details of the patients were kept confidential throughout the study.

Study Procedure

After obtaining the informed written consent, socio-demographic, past, and current medical history was collected from each participant, using structured pro forma. After general physical examination and systemic examination, the following investigations were done in all patients.

- Routine investigations: Hemoglobin (Hb), total count, differential count (DC), erythrocyte sedimentation rate, blood sugar, blood urea, serum creatinine bleeding time, and clotting time
- Chest X-ray posteroanterior view
- Ultrasound abdomen and chest
- Electrocardiogram
- Sputum for acid-fast bacilli (AFB) staining
- HIV, hepatitis B surface antigen
- Pleural fluid analysis (50 ml):
 - Cytological: Total leukocyte count, DC, and cytology for malignant cells
 - Biochemical: Protein and sugar
 - Adenosine deaminase
 - Lactate dehydrogenase
 - Bacteriological: (a) AFB stain, (b) Gram's stain
 - Culture for pyogenic organisms
- Pleural tissue taken by the Abram's biopsy needle and sent for histopathology examination.

Statistical Analysis

Age, gender, disease-related parameters were considered as explanatory variables. Etiology of the disease as diagnosed by histopathological examination was the primary outcome variable. Descriptive analysis of the data was done using frequency and percentage for categorical variables, mean and standard deviation for quantitative variables. The association between the explanatory and outcome variables was assessed by calculating the odds ratio and 95% confidence interval. Chi-square test was used to test the statistical significance of the association. $P = 0.05$ was considered as statistically significant. IBM SPSS version 21 was used for statistical analysis.

RESULTS

A total of 100 participants were included in the final analysis. Age-wise distribution (Table 1) showed a majority of subjects belonged to the age group of 26-45 years, whereas 23% were aged below 25 years and only 7% of them were above 60 years. On the whole, males (69%) outnumbered females (31%).

Regarding the etiological profile of pleural effusion (Table 2), the most common cause was TB (58%) followed by chronic inflammation of non-specific origin (30%) and malignancy (12%) of whom equal proportion (5%) of them had adenocarcinoma and squamous cell carcinoma.

Assessing the association between TB and age (Table 3) showed that though, subjects with TB outnumbered those without TB in all the age groups except among 46-60 years (46.16%:53.84%), there was no significant association found ($P = 0.449$) was found. Among all age groups, majority of TB cases were found above 60 years (71.42%) and in below 25 years age group (60.8%). Gender-wise assessment also showed non-significant association ($P = 0.18$) among males (53.62%:46.37%) and females (67.74%:32.25%).

Regarding the association between malignancy and age (Table 4), there was a statistically highly significant ($P < 0.001$) association across the age groups. Majority of malignancy positive cases were present in above 60 years age group (64.28%) and in below 25 years, 26 to 45 years age group (64.28%). However in 46-60 years age

group, only 11.53% have malignancy, while malignancy was completely absent in below 25 years and 26-45 years age group (0%). However, gender-wise, there was no significant association ($P = 0.85$) either among males or females. In both genders, nearly 88% was malignancy negative.

DISCUSSION

About four decades after thoracoscopy was established by Jacobaeus, the era of closed pleural biopsy needles began and soon gained considerable acceptance as well.¹³ Such procedures are supposed to be painless and necessitate the use of local anesthesia, and their main complication is pneumothorax. Owing to the larger caliber of the Abram's needle along with the respiratory movements of patients increase the risk of entry of outside air into the pleural space unless the device is kept closed. However, a very few of them require intervention though pneumothorax may be seen in about 15% of the cases.¹⁴

The study findings reveal that TB accounted for the most common reason for pleural effusion in the study subjects followed by non-specific chronic inflammation and malignancy. Similar findings were reported by Ngoh (49% cases of TB and 43% that of malignancy), whereas Lad *et al.*¹⁵ reported that 37.6% of the cases to be TB, 30.5% of malignancy, and 29.5% of them having non-specific

Table 1: Age and gender distribution of study participants

Parameter	Frequency (%)
Age group	
Below 25	23 (23)
26 to 45	37 (44)
46 to 60	26 (28)
Above 60	14 (7)
Gender	
Males	69 (69)
Females	31 (31)

Table 2: Etiological profile of pleural effusion (n=100)

Etiology	Frequency (%)
Tuberculosis	58 (58)
Chronic non-specific inflammation	30 (30)
Malignancy	12 (12)
Adenocarcinoma	5 (5)
Squamous cell carcinoma	5 (5)
Others	2 (2)

Table 3: Association tuberculosis with age and gender of study population

Parameter	Tuberculosis		Chi-square value	P
	Present (%)	Absent (%)		
Age group				
Below 25	14 (60.8)	9 (39.13)	2.64	0.449
26-45	22 (59.45)	15 (40.54)		
46-60	12 (46.15)	14 (53.84)		
Above 60	10 (71.42)	4 (28.57)		
Gender				
Male	37 (53.62)	32 (46.37)	1.75	0.18
Female	21 (67.74)	10 (32.25)		

Table 4: Association of malignant pleural effusion with age and gender

Parameter	Malignancy		Chi-square value	P
	Present (%)	Absent (%)		
Age group				
Below 25	0 (0)	23 (100)	44.43	<0.001
26-45	0 (0)	37 (100)		
46-60	3 (11.53)	23 (88.46)		
Above 60	9 (64.28)	5 (35.71)		
Gender				
Male	8 (11.59)	61 (88.40)	0.034	0.85
Female	4 (12.90)	27 (87.09)		

inflammation and Maji *et al.* found TB in 54.5% of cases and malignancy in 28.1% of them.¹⁶ Contrasting with our study findings, How *et al.* found that malignancy was the most common (34.2%) cause of pleural effusion while TB accounted for 22.5% of the cases.¹⁷

Regarding the age-wise distribution of subjects, we found that most of TB cases (36 out of 58) were aged 45 years and below, while all the cases of malignancy belonged to the age group of 46-60 years and above 60 years (12:10). The study by Lad *et al.* found the mean age of patient with TB was 49 years while for malignant patients was 63 years.¹⁵

The overall diagnostic yield of Abram's needle biopsies for TB pleuritis in a population with a high pretest probability for the disease was found to be 81.8%. In one of the largest prospectives and the first randomized study performed to compare the US-assisted Abram's needle biopsies with US-assisted Tru-Cut needle biopsies with regard to the diagnostic yield for pleural TB¹⁸ concluded that the use of Abram's needle are more likely to extract the pleural and have a significantly higher diagnostic sensitivity for pleural TB. It further opined that Abram's needle should be the choice for closed pleural biopsies, especially in areas where the prevalence of TB is high.

CONCLUSION

To conclude the study findings reveal that Abram's needle can be a useful aid in identifying exudative pleural effusion, especially in subjects with TB employing closed pleural biopsy method. However, owing to the small sample size, a definitive conclusion of it can be obtained when different needles are compared with a larger sample specially in Indian population.

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Antibiogram of Isolates from Cubital Fossa and Web Spaces of Hands of Hospitalized Patients

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Abstract

Background: Human beings harbor a wide array of microorganisms both on and in their bodies. The normal flora depends on the area of the body, the clothing one wears, occupation, and environment. This normal flora can be replaced by multiple antibiotic resistant bacteria in hospitalized patients.

Objective: To study the antibiogram of the aerobic isolates from the cubital fossa and web spaces of hands of hospitalized patients.

Materials and Methods: About 200 swabs were collected from 50 inpatients from various wards after taking consent. The swabs were processed in the microbiology laboratory by standard protocol. The isolates were identified by a set of standard biochemical reactions. The antibiotic susceptibility was done by Kirby-Bauer's disc diffusion method laid by Clinical and Laboratory Standards Institute (CLSI) guidelines.

Results: Out of 50 patients, 80% were male and 20% were female. 23 patients had a history of previous hospital stay. 18 patients were diabetic. Out of 200 swabs, 94 showed growth (47%). 43 swabs (45.7%) from cubital fossa showed growth, whereas 51 swabs (54.2%) from finger web spaces showed growth. Methicillin-resistant coagulase-negative staphylococci (MRCoNS) were the predominant bacteria isolated (94.5%). They were found to be sensitive to linezolid (90%), doxycycline (80%), and aminoglycosides (77%). One each of *Escherichia coli*, *Enterococci*, and *Proteus* species was isolated.

Conclusion: In our hospital, the hospitalized patients from various wards were found to harbor MRCoNS in cubital fossa and web spaces of hands. Such colonization can persist after hospital discharge and can serve as a reservoir. Thus, patient education activities such as hand washing and bathing regimens are required to minimize skin colonization by resistant bacteria.

Key words: Coagulase-negative staphylococci, Cubital fossa, Methicillin resistance, Web spaces

INTRODUCTION

Human beings harbor a diverse group of microbial population on their skin and mucous membrane called normal flora. The normal flora depends on the area of the body, the clothing one wears, occupation, and environment. These microorganisms can be divided into two categories, namely, resident or transient. The resident flora consists of microorganisms that are life-long members of the body's

normal microbial community. Resident flora is less likely to be associated with infections but may cause infections on non-intact skin and in sterile body cavities.¹

The transient flora consists of microorganisms that inhabit the skin or mucous membranes temporarily for hours, days, or weeks. It is usually derived from the environment and does not establish itself permanently on the surface. As long as the resident flora is intact, transient microorganisms assume little significance. However, if the resident flora is disturbed, transient flora may colonize, proliferate, and produce disease.²

In hospitals, patients may acquire multiple antibiotic resistant bacteria from the healthcare workers and hospital environment replacing the normal indigenous microbiota.

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This study was conducted to know the antibiogram of the aerobic isolates from the cubital fossa and web spaces of hands of hospitalized patients.

MATERIALS AND METHODS

Study Population

About 200 swabs were collected from cubital fossa and web spaces of hands of 50 inpatients from various wards after taking consent.

Sampling Technique

The cubital fossa and web spaces of hands were sampled because these are moist areas that are known to harbor relatively large numbers of bacteria. Sterile cotton-tipped swabs were pre-moistened with sterile normal saline. The cubital fossa and web spaces of both the hands were swabbed in circular motions for 20 times: 10 times in each direction.

Sample Processing

The swabs were inoculated onto 5% sheep blood agar and MacConkey's agar, and the plates were incubated aerobically at 37°C for 72 h. The isolates were identified by Gram's staining and a set of standard biochemical reactions.

Antimicrobial Susceptibility Testing

The Kirby-Bauer's disc diffusion method laid by CLSI guidelines was used to test the antimicrobial susceptibilities of organisms isolated.

- Gram-positive isolates were tested against amoxicillin-clavulanic acid, cotrimoxazole, ceftazidime, doxycycline, clindamycin, linezolid, ciprofloxacin, and amikacin.
- Gram-negative isolates were tested against ampicillin-sulbactam, piperacillin-tazobactam, ceftazidime, ceftazidime-clavulanic acid, ciprofloxacin, amikacin, and imipenem.

RESULTS

Out of 50 patients, 40 (80%) were male and 10 (20%) were female. 23 patients had a history of previous hospital stay. 18 patients were diabetic (Figures 1-5).

Out of 200 swabs, 94 showed growth (47%). 43 swabs (45.7%) from cubital fossa showed growth, whereas 51 swabs (54.2%) from finger web spaces showed growth (Figure 6).

Coagulase-negative staphylococci (CoNS) were the predominant bacteria isolated (96.8%). Methicillin resistance was seen in 94.5% of the CoNS isolates. They were found to be sensitive to linezolid (90%), doxycycline (80%), and aminoglycosides (77%).

One each of *Enterococci*, *Escherichia coli*, and *Proteus* species was isolated (Figure 7).

DISCUSSION

The term normal flora encompasses microorganisms that are frequently found in various body sites in normal,

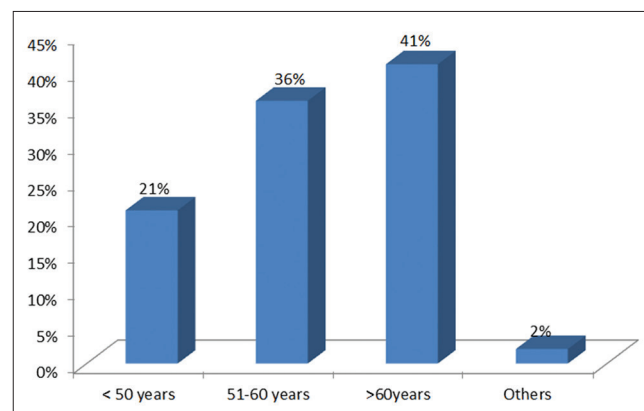


Figure 1: Age distribution

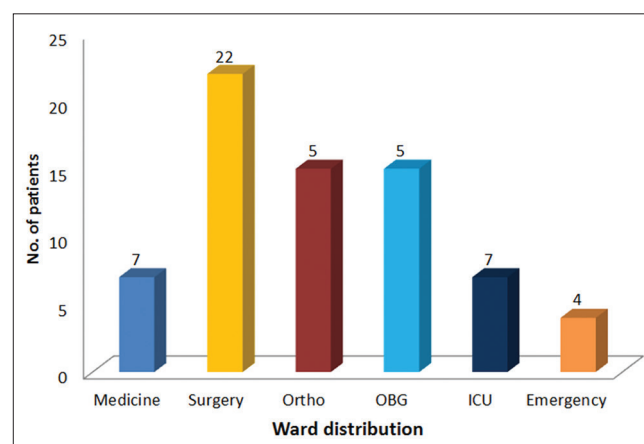


Figure 2: Ward distribution

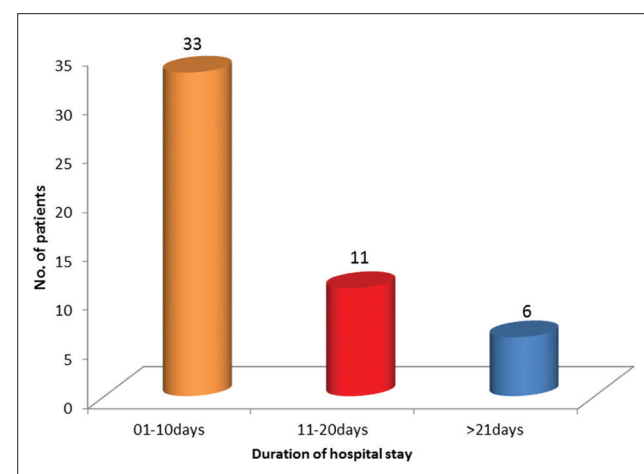


Figure 3: Duration of hospital stay

healthy individuals. The type of flora and as well the number varies in different body sites, different age groups, gender, and physiologic states. Environmental factors such as occupation, clothing, and antibiotic usage may also modulate colonization by the skin microbiota.

The predominant resident microorganism of the skin is *Staphylococcus epidermidis*.¹ Other resident bacteria include *Staphylococcus hominis* and other CoNS, followed by coryneform bacteria (*Propionibacteria*, *Corynebacteria*, *Dermobacteria*, and *Micrococci*).¹

Table 1: Antibiotic susceptibility pattern of CoNS

Antibiotic	Sensitivity %
Amoxicillin/clavulanic acid	16
Co-trimoxazole	16
Doxycycline	80
Linezolid	90
Clindamycin	55
Ciprofloxacin	22
Amikacin	77

CoNS: Coagulase-negative staphylococci

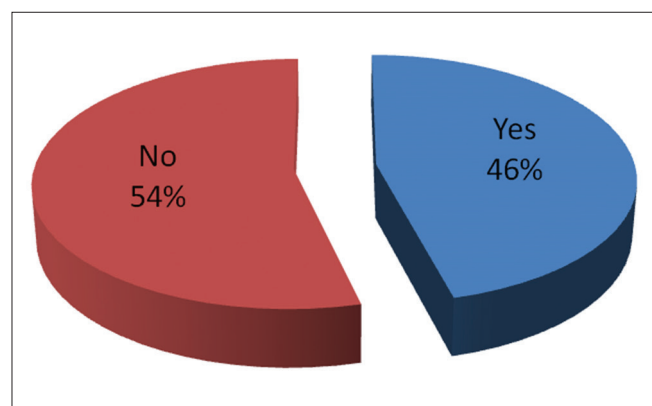


Figure 4: H/O previous hospital stay

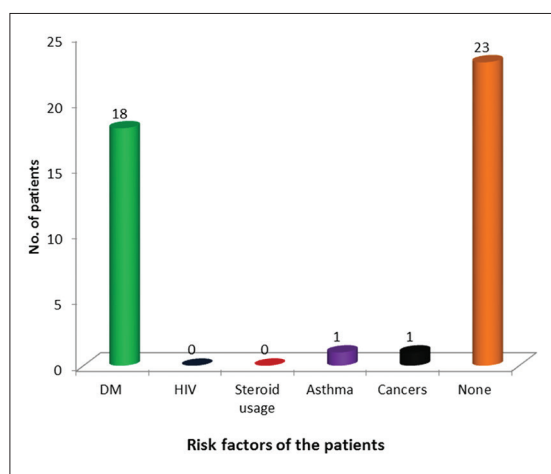


Figure 5: Risk factors

In hospitals, patients often acquire transient microorganisms during direct contact with healthcare workers, other patients, and contaminated environmental surfaces adjacent to the patient. The rate of transmission of transient flora depends on the species present, the number of microorganisms on the surface and the skin moisture.² Further, it has been observed that multiple antimicrobial resistance of the skin flora in hospitalized patients is very common.

The risk of colonization by multi-resistant bacteria in hospitals is associated with use of antimicrobials, advanced age, prolonged hospitalization, exposure to invasive medical devices, severe underlying medical condition and immunosuppression.^{3,4}

In the present study, diabetes was the most significant risk factor observed. 36% of patients were diabetic. CoNS were the predominant organism isolated. This is similar

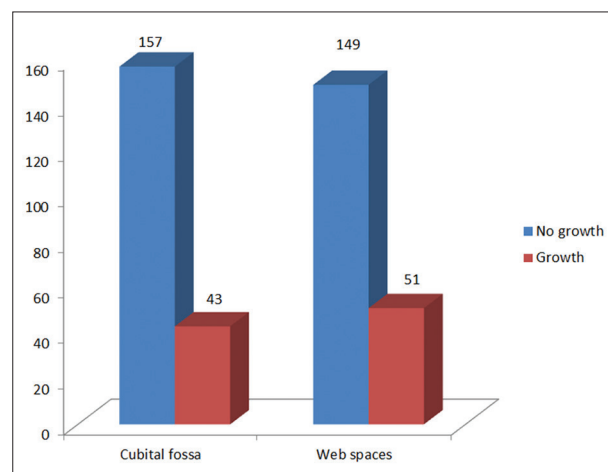


Figure 6: Number of swabs showing growth from cubital fossa and web spaces

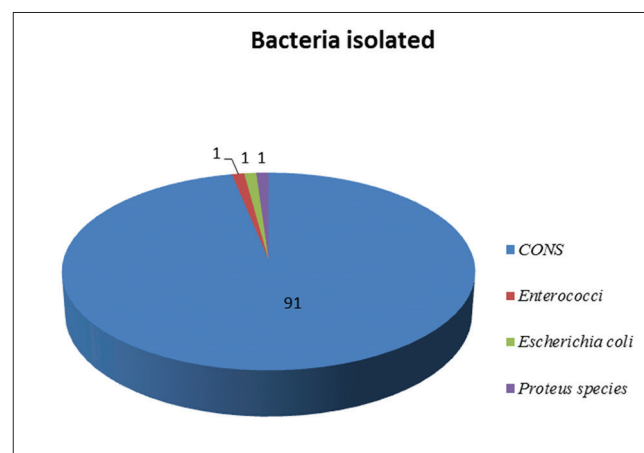


Figure 7: Isolates from cubital fossa and web spaces

to another study, in which *S. epidermidis* was commonly isolated from the skin of diabetic subjects.⁵

In the present study, CoNS were the predominant bacteria isolated (96.8%) from the cubital fossa and web spaces of hands of the hospitalized patients of various wards and methicillin-resistant coagulase-negative staphylococci (MRCoNS) was seen in 94.5% of the isolates. They were found to be sensitive to linezolid (90%), doxycycline (80%), and aminoglycosides (77%) (Table 1). This is higher when compared to a study conducted by Larson *et al.*, in which CoNS were isolated from 56.3% of toe web spaces of patients, and methicillin resistance was seen in 44.3%.³

Resistance to antibiotics was seen more in the methicillin-resistant isolates compared with those that were methicillin sensitive. This is similar to a study conducted by Koksall *et al.* and Jain *et al.*, in which the resistance to antibiotics was found to be extremely high in the methicillin-resistant strains compared to those that were susceptible to methicillin.^{6,7}

Furthermore, in 23 patients who had history of previous hospital stay, CoNS were the predominant bacteria isolated.

CoNS, which were previously regarded as innocuous commensal microorganisms on the human skin and mucous membranes, have now emerged as predominant pathogens in hospital-acquired infections. They are by far the most common cause of bacteremia related to indwelling devices. Other important infections due to CoNS include central nervous system shunt infections, native or prosthetic valve endocarditis, urinary tract infections, surgical wound infections, osteomyelitis, peritonitis in patients with continuous ambulatory peritoneal dialysis, and endophthalmitis.⁸

The increasing resistance of CoNS to antimicrobial drugs is not a less problem. Antibiotic therapy inhibits the normal, sensitive bacterial flora of the body and thereby provides an environment that facilitates colonization by antibiotic-resistant bacteria.⁹ After exposure to multiple antibiotics, surgical prophylaxis, indiscriminate use of antibiotics, patients become colonized with multi-drug resistant strains of CoNS species.

Multiple antibiotic resistance is characteristic of hospital strains of CoNS.¹⁰ This is due to the fact that resistance plasmids are transferrable between different strains of CoNS and also between them and *Staphylococcus aureus*.¹¹ Such flora serves as a reservoir for transmission of resistant strains to the hospital environment, other staff, patients, and household contacts.

We educated all the patients who participated in the study about hand hygiene measures. There was a significant decrease in the number of swabs showing growth collected after washing of hands with soap.

Limitations

The limitation of the present study is that the sample size was small. Another limitation is that we did not include other risk factors. Future studies should be done with large sample size and other risk factors to know the prevalence and changing trends of antibiogram of MRCoNS.

CONCLUSION

CoNS have long been regarded as non-pathogenic, but their important role as pathogens is increasing. There is a significant increase in the multidrug resistant bacteria colonizing hospitalized patients due to the capability of these bacteria to adapt rapidly to antibiotic stress. Furthermore, such colonization can persist even after hospital discharge. Colonized patients who are readmitted to wards can serve as a reservoir for further spread of multi-resistant organisms in hospitals and thus have become a major concern to the medical community. Patient education activities such as hand washing and bathing regimens are required to minimize skin colonization by resistant bacteria.

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Pattern of Oral Cavity Lesion: A Retrospective Study of 350 Cases

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Abstract

Introduction: Oral cancer is a global health problem with increasing incidence and mortality rates. In India, a vast majority of oral cancers are preceded by precancerous lesions and conditions caused by the use of tobacco in some form.

Aim and Objectives: To determine the types and relative frequency of the oral cavity lesions, and to assess their age, sex, and site distribution.

Materials and Methods: This was a retrospective study carried out in the Department of Histopathology, Pt. J.N.M Medical College, Raipur, from January 2010 to December 2010 and May 2013 to December 2013. A total 350 cases of oral cavity lesions were studied.

Result: Malignant lesions (74%) were more common than benign lesions (26%). The most common site was buccal mucosa (54%) followed by tongue (16.6%). Among malignant lesions, squamous cell carcinoma (SCC) was the single most common entity constituting 71.4%.

Conclusion: A variety of lesions were encountered in the study with predominance of malignant lesions. SCC was the most common malignant lesion.

Key words: Buccal mucosa, Malignancy, Oral cavity, Squamous cell carcinoma

INTRODUCTION

The oral cavity is the point of entry for the digestive and respiratory tract. The mucous membrane of the mouth consists of squamous epithelium covering vascularized connective tissue. The epithelium is keratinized over the hard palate, lips, and over gingiva, while elsewhere, it is non-keratinized. Mucous glands (minor salivary glands) are scattered throughout the oral mucosa. Sebaceous glands are present in the region of the lips and buccal mucosa only. Lymphoid tissue is present in the form of tonsils and adenoids.

Lesions involving oral cavity are very common in India, especially in the areas where tobacco, pan, and related

products are extensively used. Tongue, lip, floor of mouth, hard palate, gingiva, and buccal mucosa are usually involved. Most of these lesions are either neoplastic or non-neoplastic. Among the malignant lesions, squamous cell carcinoma (SSC) is single most common malignant lesion of this region. Early diagnosis is very important and can be lifesaving, because in late stages, they may be progressed to severe dysplasia and even carcinoma *in situ* and/or SCC. In India, the age-standardized incidence rate of oral cancer is 12.6/100,000 population. According to the World Health Report 2004, cancer accounted for 7.1 million deaths in 2003.¹ In South East Asia, oral and oropharyngeal SCC account for 40% of all cancers compared with approximately 4% in developed countries.²

MATERIALS AND METHODS

This was 1.8 years retrospective study done in the Department of Pathology of cases of oral lesions, attending Department of ENT and Regional Cancer Institute, Pt. J.N.M. Medical College and associated

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Dr. B.R.M.A. Hospital, Raipur (C.G.), from January 2010 to December 2010 and May 2013 to December 2013. A total of 350 blocks and stained histopathological slides (H and E stained) were retrieved from histopathology section and reviewed by two pathologists. Data regarding the age and sex of subjects and location and type of lesions were obtained from biopsy register for each case.

RESULTS

In the present study, the affected age range was from 8 years to 90 years. The youngest patient (8-years-old male child) presented with mucocele of the lower lip and the oldest patient (85-years-old male), with SCC of buccal mucosa. Lesions were more common in males than in females (3:1). The more common age group was 50-60 years. Most of the cases were using tobacco products such as Gutka, Khaini, and Zarda. Among 350 cases, 259 cases (74%) were malignant, and 91 cases (26%) were benign. The most common site was buccal mucosa (54%) followed by tongue (16.6%), gingival (14%), hard palate (4.3%), etc. (Table 1). Different types of non-neoplastic and neoplastic lesions were identified in the study. Out of the 350 cases, the most common lesion was observed SCC (71.42%), followed by keratosis without dysplasia (14.28%), keratosis with dysplasia (5.7%), chronic inflammation (2%), etc. (Table 2).

DISCUSSION

Oral cancer is a global health problem with increasing incidence and mortality rates. In India, a vast majority of oral cancers are preceded by precancerous lesions and conditions caused by the use of tobacco in some form.

In our study, a total of 350 cases were analyzed, others Mujica *et al.*³ and Hassawi *et al.*⁴ were included number of cases 340 and 303, respectively, that was nearby to our study.

In the present study, the age ranges were 8-90 years by Al-Khateeb⁵ and by Furlong *et al.*⁶ observed age ranged from 6 to 98 years and 9 to 98 years, respectively. In our study, the majority of the cases belonged to the age group 40-60 years. Most of the individuals were of the age group of 41-50 years followed by the age group of 51-60 years. Saraswati *et al.*⁷ performed a study on the prevalence of oral lesions in relations to habits and reported the maximum patients with oral malignancy belonged to the age group of 40-61 years. This age group was similar to the age group of our study, i.e., 40-60 years. Modi *et al.*⁸ observed most of the cases of oral lesions were using chewing tobacco product, and most of the carcinomas

Table 1: Number of cases according to sites

Sites	Number of cases	Total (%)
Buccal mucosa	189	54
Tongue	58	16.57
Gingival	49	14
Lip	23	6.57
Hard palate	15	4.28
Cheek	07	2
Tonsil	05	1.42
Angle of mouth	04	1.14
Total	350	100

Table 2: Different types of non-neoplastic and neoplastic lesions of oral cavity

Lesions	Number of cases	Total (%)
Mucocele	02	0.57
Chronic inflammation	07	2
Granuloma pyogenicum	01	0.28
Hemangioma	04	1.14
Squamous papilloma	02	0.57
Schwannoma	01	0.28
Odontogenic tumor and ameloblastoma	03	0.85
Benign fibrous tumor	03	0.85
Keratosis without dysplasia	50	14.28
Keratosis with dysplasia	20	5.71
Verrucous carcinoma	04	1.14
Squamous cell carcinoma	250	71.42
Low-grade mucoepidermoid carcinoma	01	0.28
Malignant melanoma	01	0.28
Metastasis	01	0.28
Total	350	100

were seen between 41 and 70 years. Mujica *et al.*³ observed oral malignant or malignant lesions associated to tobacco use and cases ranging 60-74 years.

In our study, male to female ratio was 3:1. This shows that there was a high incidence of oral premalignant and malignant lesions in male as compared to females. Palve *et al.*⁹ observed that out of 50 cases, 60% patients were males and 40% were females in their study with male to female ratio of 3:2, i.e., male preponderance which is similar to our findings. Sengunver *et al.*¹⁰ and Pudasaini *et al.*¹¹ were reported slightly male preponderance in their study.

In our study, the most common site involved was buccal mucosa (54%) followed by tongue (16.6%), gingival (14%), lip (6.6%), and hard palate (4.3%). Similar findings were seen in a study done by Modi *et al.*⁸ reported site of involved was buccal mucosa (26.8%), tongue (26.1%), gingival (2%), lip (6.7%), and hard palate (12.6%). By Mehta *et al.*¹² observed sites were buccal mucosa (32%), tongue (19%), gingival (3%), lip (22%), and hard palate (2%) and by Mehrotra *et al.*¹³ reported that on the basis of

site of involvement in benign and premalignant groups, the buccal mucosa appeared to be most frequently involved site followed by the tongue.

In our study, mucocele was reported 0.57% of oral lesions, found in lip. Others reported much high by Oliveira *et al.*,¹⁴ Mehta *et al.*,¹² Al-Khateeb,⁵ and Pudasaini *et al.*,¹¹ 52.3%, 26%, 11%, and 9.5%, respectively, from lip.

In our study, chronic inflammation was observed 2%; others reported much high by Hassawi *et al.*,⁴ Mehta *et al.*,¹² Pudasaini *et al.*,¹¹ and Modi *et al.*⁸ 55.1%, 21%, 19%, and 10.1%, respectively. Isaac *et al.*¹⁵ also observed submucosal change such as diffuse chronic inflammatory infiltrate.

Granuloma pyogenicum has been associated with hormonal imbalance. High concentration of estrogen is thought to induce macrophages to secrete high levels of vascular endothelial growth factor. Granuloma pyogenicum was seen 0.57% in our study; others reported much high by Hassawi *et al.*,⁴ Al-Khateeb,⁵ Modi *et al.*,⁸ and Senguen *et al.*,¹⁰ 47.9%, 19%, 13.5%, and 5.1%, respectively, in their study.

In our study, hemangioma was observed 1.14%, similarly by Mehta *et al.*¹² observed 1%, and others observed much high by Hassawi *et al.*,⁴ Pudasaini *et al.*,¹¹ and Mujica *et al.*,³ 30%, 14.2%, and 11%, respectively.

Squamous papilloma was reported 0.57% in our study, by Mujica *et al.*,³ Misra *et al.*,¹⁶ Modi *et al.*,⁸ Al-Khateeb,⁵ and Mehta *et al.*¹² reported higher, 11%, 9.89%, 7.6%, 6%, and 2%, respectively, in their study.

In our study, odontogenic tumor and ameloblastoma were reported 0.85%, whereas by Pudasaini *et al.*¹¹ and Modi *et al.*⁸ reported high 4.8% and 1.7%, respectively, in their study. By Goyal *et al.*¹⁷ reported 3 cases and 1 case of odontogenic tumor involved jaw bone. Ameloblastoma were seen by Misra *et al.*¹⁶ in their study.

Benign fibrous lesions were 0.85% in our study, whereas by Pudasaini *et al.*,¹¹ Misra *et al.*¹⁶ and Hassawi *et al.*⁴ reported higher 9.5%, 6.65%, and 4%, respectively. Fibrosis was observed by Isaac *et al.* and Senguen *et al.*¹⁰ Tobacco products may act as a chronic irritant to buccal mucosa and tongue. Oral submucosal fibrosis predominantly affected female.

Schwannoma is a benign neural neoplasia of Schwann cell origin. It is relatively uncommon, although 25-48% of all cases occur in head and neck region. The lesion is most common in young and middle-aged adults and can range from a few millimeters to several centimeters in size. The

tongue is the most common location for oral schwannoma, although the tumor can occur almost anywhere in the mouth. In our study, there was one case (0.28%) of a 35-years-old male patient diagnosed as schwannoma of the tongue. The immunohistochemical study of the tumor showed positivity for S-100. By Al-Khateeb⁵ observed 8% schwannoma in their study (Figures 3 and 4).

Keratosis without dysplasia and keratosis with dysplasia were reported 14.28% and 5.71%, respectively, in our study similarly by Mehta *et al.*¹² reported 14% and 2%, respectively, in their study. 8.6% dysplasia was seen by Isaac *et al.*¹⁵ in their study.

Verrucous carcinoma is a specific, well-differentiated and non-metastasizing variant of SCC. It appears as a painless, thick white plaque resembling a cauliflower. The most common sites of oral mucosa involvement include the buccal mucosa, followed by the mandibular alveolar crest, gingiva, and tongue. In our study, there were 4 cases (1.14%)

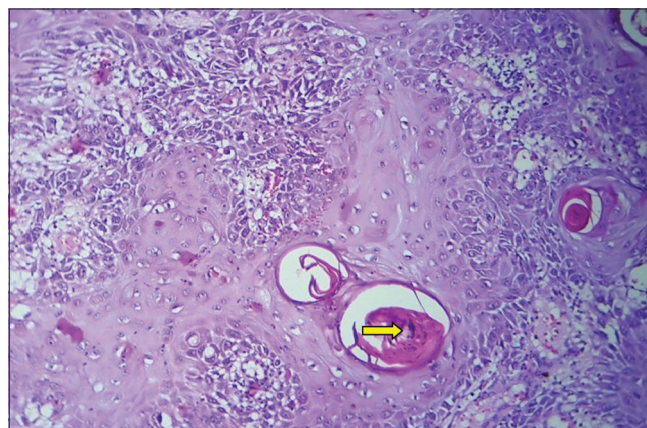


Figure 1: Photograph showing well-differentiated squamous cell carcinoma with formation of keratin pearls (H and E stain, x10)

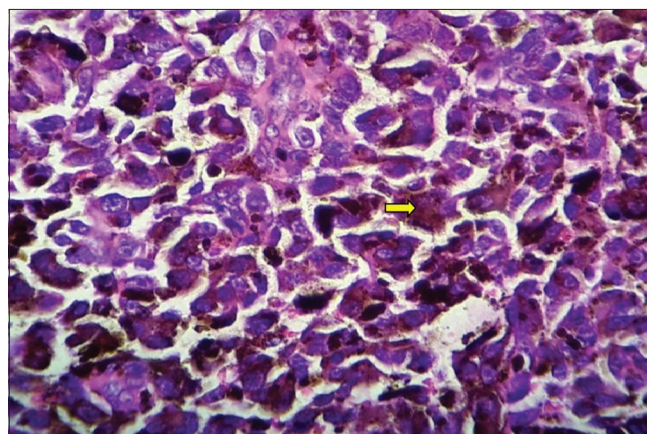


Figure 2: Photograph showing malignant melanoma, malignant cells extending deeply within the lamina propria, the tumor cells contain fine granular melanin pigment (H and E stain, x10)

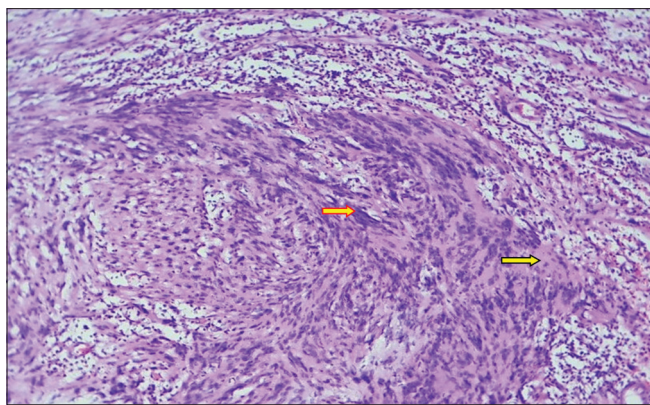


Figure 3: Photograph showing schwannoma, whorls of densely cellular (Antoni A) (orange and yellow) and loosely cellular (Antoni B) (yellow) area with characteristic nuclear palisading (Verocay bodies) (H and E stain, $\times 10$)

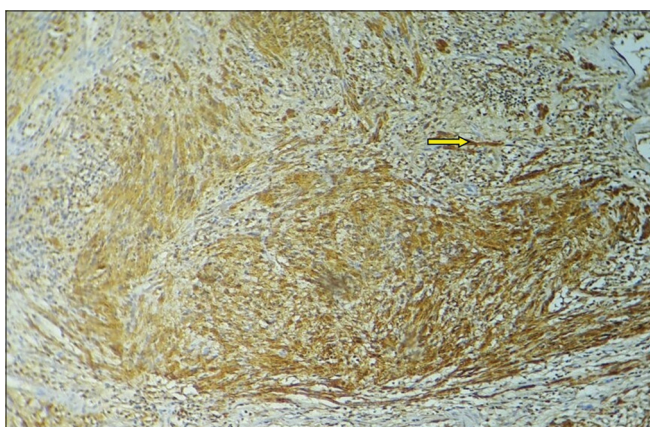


Figure 4: Photograph showing schwannoma, immunohistochemical reaction demonstrating tumor cells that are positive for S-100 protein of the same (H and E stain, $\times 10$)

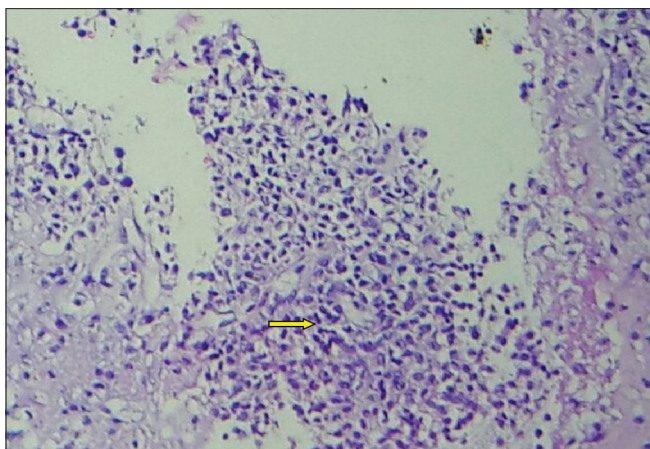


Figure 5: Photograph showing metastatic deposition of malignant cell (H and E, $\times 100$)

of verrucous carcinoma of 45-50-years-old male patients. The site was buccal mucosa. Similarly by Mehta *et al.*¹² and by Modi *et al.*⁸ observed 1.7% and 1% in their study.

The observed overall SCC 71.42% was most common lesions; the age ranged from 40-61 years. This could be attributable to the early development of oral habits and easy availability of tobacco products. 11 cases of SCC reported in our study in below 30 years age group, with male predominance. The most common site was buccal mucosa followed by tongue and lip. In studies done by Ildstad *et al.*¹⁸ and Weber *et al.*¹⁹ the majority of SCCs were seen in the 6th decade. However, by Misra *et al.*¹⁶ Hassawi *et al.*⁴ reported 60.12% and 58.9%, respectively, that was lower than our study. Some researcher also observed SCC such as by Modi *et al.*⁸, Mehta *et al.*¹², Pudasaini *et al.*¹¹ and Mujica *et al.*³ 26.9%, 22%, 4.8%. and 2%, respectively (Figure 1).

Mucoepidermoid carcinoma is the most common malignant intraoral salivary gland tumor. There was a case of a 45-years-old female patient diagnosed as low-grade mucoepidermoid carcinoma of hard palate constituted 0.28% in oral lesions in our study. Similar finding was seen in a study done by Mehta *et al.*¹² He reported a case of a 30-years-old female patient diagnosed as low-grade mucoepidermoid carcinoma of hard palate constituted 1%. By Hassawi *et al.*⁴ and Modi *et al.*⁸ observed 5.1% and 0.8%, respectively, in their study.

Primary malignant melanoma of oral cavity is very rare. Its prevalence ranges from 0.4% to 1.4% of oral cavity and 2% to 5% of all the melanomas. Lesions are slightly more common in males than females. Shah *et al.*²⁰ reported two cases of malignant melanoma which involved palate and maxillary gingiva and mandibular gingival, respectively. One case of malignant melanoma constituted 0.28% and was reported in our study. The patient was a 55-years-old male patient with a blackish irregular growth over hard palate (Figure 2).

Metastatic tumors of the oral cavity are represented approximately 1% of all oral malignancies. Such metastasis can occur in bony areas or soft tissues in the oral cavity. Rajappa *et al.*²¹ reported two cases of metastasis in the oral cavity. One case of metastatic tumor in the oral cavity constituted 0.28% and was reported in our study. The patient was 48-years-old female patient had diagnosed as a case of primary lung carcinoma (Figure 5).

CONCLUSION

A variety of lesions were encountered in the study with predominance of malignant lesions, SCC being the commonest. Oral cavity lesions were frequently occurring in adults, displaying various histopathological patterns, and pathologists need to be familiar with these lesions. Correct identification of these lesions is utmost important.

Furthermore, awareness among the people for the harmful effect of smoking and tobacco, especially in developing countries like ours, is a dire need of time.

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Diagnostic Accuracy of Magnetic Resonance Imaging in Characterizing Intracranial Space Occupying Lesions: A Cross-sectional Study

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Abstract

Introduction: Intracranial space occupying lesion (ICSOL) is one of the common indications in patients undergoing magnetic resonance imaging (MRI) brain. ICSOL can be due to varied etiology such as neoplastic, inflammatory, infective, and vascular.

Purpose: An accurate diagnosis is essential to avoid unnecessary interventions and follow-up. In this study, we try to evaluate the role of MRI in providing an accurate diagnosis.

Materials and Methods: A total of 100 consecutive patients who underwent MRI brain in our institution and came up with a diagnosis of ICSOL were included in our study. The radiological diagnoses were correlated with histopathological/biochemical studies, wherever applicable. Clinico-radiological correlation is made in rest of the cases.

Results: Out of the 100 cases, 63 cases were of neoplastic origin, 24 cases were infective, and rest were of inflammatory/vascular origin. Of the neoplastic cases, 55 cases were malignant and 8 cases were benign. Correct MRI diagnoses were made in 52 of the 55 malignant cases. Sensitivity of 94.5%, specificity of 75%, positive predictive value of 96.29%, and negative predictive value of 66.66%. Among the 24 cases of infective origin, correct MRI diagnoses were made in 20 cases.

Conclusion: MRI is invaluable in characterizing the ICSOLs. Addition of CT and magnetic resonance spectroscopy increases the specificity of diagnosing malignant ICSOL to 87% from 75% when MRI alone is used.

Key words: Brain, Data accuracy, Diagnosis, Magnetic resonance imaging, Pathology

INTRODUCTION

Intracranial space occupying lesions (ICSOLs) are a collective term for any lesion which occupies space within the intracranial fossa and causes raised intracranial pressure. An ICSOL is usually due to malignancy, but it can be caused by other pathologies such as infective, inflammatory, vascular, and traumatic. The lesion can cause focal brain damage, obstruction of cerebrospinal fluid flow, or general symptoms related to raised intracranial pressure such

as seizures or false localizing signs. The high morbidity and mortality associated with them necessitate their early diagnosis so as to plan the intervention that is required.¹ Magnetic resonance imaging (MRI) provides excellent soft tissue contrast, which makes MRI the imaging modality of choice for ICSOLs. MRI has helped in the early diagnosis and localization of the ICSOL and has brightened the prognosis of mass lesions.²

Aims of the study are:

1. To assess the accuracy of MRI in the characterization of ICSOLs when compared with histopathological/clinico-radiological correlation.
2. To assess the diagnostic accuracy of MRI in differentiating benign from malignant lesions.
3. To assess the role of MRI in differentiating neoplastic and other etiologies.

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MATERIALS AND METHODS

About 100 consecutive patients who underwent MRI Brain in Chettinad health and research institute from January 2013 to April 2016 and came up with a diagnosis of ICSOLs were included in our study. MRI was performed on GE 1.5 tesla MRI Scanner. Routine MRI sequences such as axial T1W, T2W fast spin echo, Fluid-attenuated inversion recovery axial and coronal, Sagittal T1 were acquired on all patients. Fat-saturated T1W images were acquired in axial, coronal, and sagittal planes after administration of 10 ml of Gadolinium contrast. MR Angiogram, MR venogram, Magnetic resonance spectroscopy (MRS), and correlative CT were done whenever required. Those ICSOLs which were caused by trauma were excluded from the study.

Evaluation of all images was performed by two experienced neuroradiologists. Each ICSOL were assessed for signal characteristics, size, shape, location, margins, and associated ancillary findings. And a radiological diagnosis was made, taking into consideration, all the imaging findings and clinical history. Later, ICSOLs were subjected to histopathological examination/surgery wherever possible. Those patients who were not subjected to histopathological examination or surgery were followed up and evaluated for response to appropriate treatment. Obtained results were tabulated and subjected to statistical analysis using IBM SPSS software version 20.0.

RESULTS AND OBSERVATION

Out of the 100 patients included in the study, 41 were females and 59 were males. Age of the patients ranged from 2 to 71 years as illustrated in Graph 1.

Out of the 100 cases, 63 cases were of neoplastic origin, 24 cases were infective, and rest were of inflammatory/vascular origin. Of the neoplastic cases, 55 cases were malignant and 8 cases were benign. Metastasis was the most common diagnosis among the malignant intracranial ICSOLs which was followed by supratentorial glioma. Meningioma was the most common benign ICSOL. Correct MRI diagnoses were made in 52 of the 55 malignant cases. Sensitivity of 94.5%, specificity of 75%, positive predictive value of 96.29%, and negative predictive value of 66.66%.

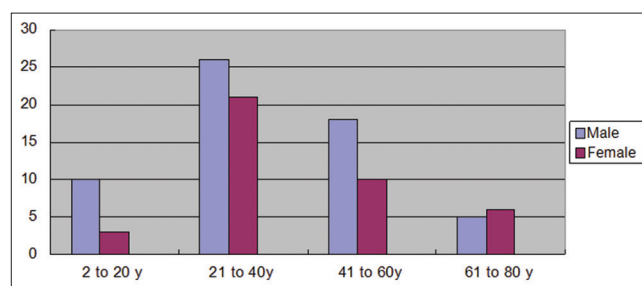
Among the 24 cases of infective origin, correct MRI diagnoses were made in 20 cases. Sensitivity of 80%, specificity of 50%, positive predictive value of 90.9%, and negative predictive value of 33.33%. Among the infective causes of ICSOLs, the most common diagnosis was tuberculoma. All the cases of cerebral abscesses were

correctly diagnosed in MRI. Two cases were wrongly diagnosed as en plaque meningioma in MRI was later found to be hypertrophic pachymeningitis. Two cases were diagnosed in MRI as granulomatous lesions, later turned out to be tumefactive demyelination.

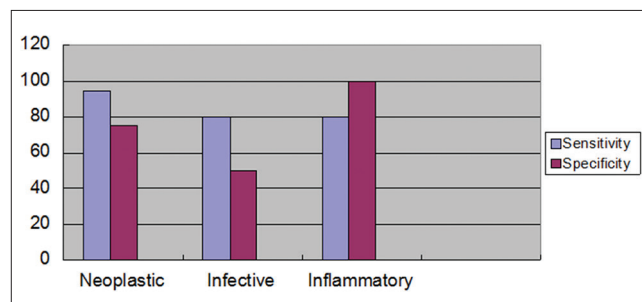
MRI correctly diagnosed 8 out of the 10 inflammatory cases of ICSOLs. The sensitivity of 80%, specificity of 100%, positive predictive value of 100%, and negative predictive value of 0%. Three cases were due to vascular causes such as cavernoma, which were correctly diagnosed by MRI. The results obtained in various categories of ICSOLs are tabulated here in Graph 2.

DISCUSSION

Conventional MR sequences provide mainly anatomical and structural information about the relation of a brain tumor to the surrounding tissue and may help to differentiate brain tumors from other central nervous system (CNS) pathologies.³ Neoplasms form more than 50% of the ICSOLs. There is a reported tendency toward a higher incidence of gliomas in highly developed, industrialized countries and some reports indicate that Caucasians are more prone than African or Asian populations.⁴ In the recent past, the incidence of patients with CNS tumors appears to be somewhat increasing.⁵ CNS tumors are the second commonest overall and the most common solid tumors in the pediatric population.⁶ In our study, MRI shows high sensitivity (94.5%) for diagnosing neoplastic lesions but lesser specificity (75%).



Graph 1: Age distribution



Graph 2: Comparison of sensitivity and specificity among specific categories

In our study, non-neoplastic etiologies contributed to 37% of cases of ICSOLs. The differentiation of neoplastic from non-neoplastic etiologies is the most clinically relevant challenge. Heterogeneity within and overlap between the neoplastic and non-neoplastic spectral patterns inevitably contribute to false-positive and false-negative errors.⁷ These lead to the decreased specificity of MRI in diagnosing infective causes of ICSOLs.

Infective and inflammatory causes of non-neoplastic etiologies show similar sensitivities (80%) on MRI. However, specificity was far less (50%) for infective causes when compared with specificity for inflammatory causes (100%). All the cases with vascular etiology were correctly diagnosed with MRI. Even though MRI is the most sensitive modality for diagnosing ICSOLs, its specificity is low, especially among the infective etiologies. The most important aspect of imaging diagnosis is the differentiation between neoplastic and non-neoplastic lesions.

In some cases, the addition of MRS has aided in arriving at the correct diagnosis. MRS limits the use of established invasive diagnostic approaches such as brain biopsy, which is the gold standard for evaluating brain tumor, as brain biopsy is a heavily invasive technique.⁸

CONCLUSION

MRI has emerged as the most sensitive study in categorizing ICSOLs according to their etiology. However, its specificity is relatively poor, especially in diagnosing infective etiologies of ICSOLs. Addition of CT and MRS increases

the specificity of diagnosing malignant ICSOL to 87% from 75% when MRI alone is used.

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Knowledge, Early Signs and Symptoms, Risk Factors and Prevention of Cervical Cancer among Teachers in the Urban Schools in Al-Ahsa, Kingdom of Saudi Arabia

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Abstract

Background: Cervical cancer is a major public health problem in the world. It is the most common gynecological cancer and the second leading cause of cancer death worldwide, also it is one of the most preventable cancers. Awareness and attitude toward cervical cancer are important factors that may prevent or make the disease more curable when a patient diagnosed to have cervical cancer; teachers are in a better position to educate young girls under their domain and the society at large, and can play an important role in increasing awareness among the general population.

Objective: To assess the awareness of cervical cancer among teachers in urban schools in Al-Ahsa.

Materials and Methods: A cross-sectional study was conducted at different schools in Al-Ahsa, Kingdom of Saudi Arabia (KSA) between July 2015 and October 2015. A standardized questionnaire was used to collect information on knowledge, early signs and symptoms, risk factors and prevention of cervical cancer.

Result: The responses of 290 women; 42 (14.5%) single, 232 (80%) married, 10 (3.4%) divorced, and 6 (2.1%) widowed. The mean age of the respondents was 36.4 years and all of the respondents are educated, Most of the women were not aware of the early warning signs, symptoms, and risk factors. On average, 63.7% of the teachers were not aware of the early signs and symptoms 58.2% of the women do not have knowledge about the risk factors of cervical cancers. 66.2% of the teachers not aware of the availability of screening program KSA. Most of the women (90%) were not aware of the availability of a vaccine against human papillomavirus.

Conclusion: The majority of teachers have inadequate knowledge about early warning signs and symptoms, risk factors and prevention of cervical cancer.

Key words: Awareness, Cervical cancer, Human papillomavirus vaccine, Kingdom of Saudi Arabia, Teachers

INTRODUCTION

Cervical cancer is a major public health problem in the world.^{1,2} It is the most common gynecological cancer and the second leading cause of cancer death worldwide, at the same time it is one of the most preventable cancers.^{3,4} The World

Health Organization (WHO) estimated that the contribution of cervical cancer to adult female death is 35%.⁵⁻⁷

In the kingdom of Saudi Arabia (KSA), there are about 6.51 million women at risk of developing cervical cancer. In KSA, cervical cancer accounts 33.5% of all genital cancers.⁸ According to the WHO, there are 152 women who are diagnosed with cervical cancer yearly, and 55 of them die from the disease. It is also the eighth most common cancer in women between 15 and 55 years of age in KSA.

Since human papillomavirus (HPV) is the main cause of cervical cancer and pre-cancer,⁹ avoiding exposure to HPV could help to prevent the disease, HPV - infected women

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under 30 years of age. There are sexual behaviors increase the risk to get infected by HPV such as having sex at an early age and having many sex partners.

One of the preventive methods is Pap smear screening, which identifies cytological abnormalities of the cervical transformation zone and it has helped reducing cervical cancer incidence and mortality rates by 70% in developed countries.¹³ Alternative screening methods that might be effective in the settings with low resources are using either visual inspection with acetic acid or visual inspection with lugol's iodine.¹⁴

Another prevention method is vaccines that can protect against certain HPV infections.¹⁰ These vaccines prevent infection with HPV subtypes 16 and 18.¹¹ The vaccines also prevent infections with other HPV subtypes including some types that cause anal and genital warts. Vaccines did not treat patients who already got the infection. Therefore, the HPV vaccines must be given before the person becomes exposed to HPV such as through sexual activity.¹²

The other known risk factors for cervical cancer are a long use of oral contraceptives, immunosuppressants, and smoking.¹⁶

Most of the patient in KSA presents at an advanced stage of cervical cancer which makes the treatment difficult and increases the mortality. Therefore knowing the warning signs and symptoms of cervical cancer will make early detection and will make the disease more curable.¹⁵

Awareness and attitude toward cervical cancer are important factors that may prevent or make the disease more curable when a patient diagnosed to have cervical cancer.

Teachers are in a better position to educate young girls under their domain and the society at large, they are also a part of entry to the adolescence and their student are an important target population. Therefore, it is important to assess teacher's knowledge to develop education and awareness policy to increase their knowledge and then can be disseminated into the society and to the new generation to reduce the morbidity and mortality of cervical cancer.

The aim of this study is to determine teacher's knowledge regarding early signs and symptoms, risk factors and preventive methods of cervical cancer.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted at different schools in Al-Ahsa, KSA between July 2015 and October 2015.

Target Population

Female teachers from the age of 25 to 55 years in different schools in Al-Ahsa were targeted to assess their knowledge and ability to educate and pass the knowledge to their student as well as teachers are a part of entry to the adolescence.

Data Collection

A standardized questionnaire was used to collect information on knowledge, awareness, and attitudes of women about the risk of cervical cancer and its prevention.

The questionnaire consisted of four sections: (i) Socio-demographic data, (ii) early signs and symptoms of cervical cancer, (iii) risk factors of cervical cancer, and (iv) prevention of cervical cancer. All the questions were tested before the survey, and an oral consent has taken from the participants. The level of knowledge was assessed on 25 questions guided from Cervical Cancer Awareness Measure Toolkit Version 2.1. A sample technique used is simple random sampling.

Data Analysis

Data entry was performed using SPSS Version 19 software.

RESULT

The participants in this study were 290 female teachers working in female primary, intermediate and high schools in Al-Ahsa city which is located in the eastern region in Saudi-Arabia.

Demographic Data

The total of 290 teachers participated in the study of which 42 (14.5%) were single, 232 (80%) were married, 10 (3.4%) were divorced, and 6 (2.1%) were widowed. The mean age was 36.4 years. Out of the total participants, 10.3% have high school degree, 89.7% have bachelor degree or higher (Table 1).

Knowledge about the Early Sign and Symptoms of Cervical Cancer

Nearly 50.6% of respondents aware that vaginal bleeding between periods is a sign of cervical cancer while 16.8% said is not a sign of cervical cancer and 32.4% said do not know.

As for lower back pain, painful sexual intercourse and polymenorrhagia, it was 28.2% yes, 38.4% no and 33.4% do not know; 25.8% yes, 30.6% no and 43.6% do not know; 42.4% yes, 19.4% no and 38.2% do not know, respectively. Positive response for persistent unpleasant vaginal smell were 30.3%. For postmenopausal bleeding, it was 55.1%. 21.1% of the teachers responded that

Table 1: Demographic characteristics

Characteristics	(%)
Age (years)	
20-30	29
31-41	44.1
41-50	23.8
51-60	3.1
Education level	
High school	10.3
College or higher	89.7
Marital status	
Single	14.5
Married	80
Divorced	3.4
Widowed	2.1

bleeding during or after intercourse could be a symptom of cervical cancer. 58.6% of the teachers responded that this cervical cancer could affect the fertility while 13.1% said cervical cancer so not affect the fertility and 28.2% do not know, positive response for blood in the stool or urine were 16.5%.

As for the symptoms like persistent pelvic pain, unexplained weight loss and persistent diarrhea, it was 30% yes, 26.8% no and 43.2% do not know; 32.4% yes, 24.2% no and 43.4% do not know; 8.2% yes, 42.4% no and 49.4% do not know, respectively (Table 2).

Knowledge about the Risk Factors of Cervical Cancer

Only 38.3% of the teachers responded positively that infection with HPV is a risk factor of cervical. For smoking, it was 60.3%. As for immunodeficiency, it was 65.2% positive, 60.3% agree that long-term use of the contraceptive pill is a risk factor of cervical cancer. A positive response to chlamydia infection as a risk of cervical cancer was 19.7%, 73.1% of the respondents not sure and 7.2% disagree. For Early marriage and having many children, it was 12% agree, 32.1% not sure and 55.9 disagree, 12% agree, 32.1% not sure and 55.9% disagree, respectively. 54.1% of the teachers positively responded that genetic has a rule in cervical cancer. 74.1% of the teachers agree that not going for regular Pap smear test might increase the chance to get cervical cancer (Table 3).

Knowledge about Screening Program for Cervical Cancer

About 33.8% of the respondents aware of the availability of cervical cancer screening program in Saudi Arabia, 33.1% do not know and 33.1% were not aware of the availability of the screening program.

Knowledge about Vaccine against Cervical Cancer

Only 10% of the respondents were aware of the availability of a vaccine against cervical cancer.

Table 2: Response of the teachers regarding cervical cancer early signs and symptoms

Variables	Yes (%)	No (%)	Do not know (%)
Vaginal bleeding between periods	50.6	16.8	32.6
Lower back pain	28.4	38.2	33.4
Pain during intercourse	25.8	30.6	43.6
Polymenorrhagia	42.4	19.6	38.2
Persistent unpleasant vaginal smell	30.4	25.9	43.7
Post-menopausal bleeding	55.2	12.4	32.4
Persistent pelvic pain	30	26.8	43.2
Vaginal bleeding during or after sex	21.8	26.8	51.4
Fertility affect	58.6	13.2	28.2
Blood in the stool or urine	16.7	34.4	48.9
Unexplained weight loss	32.4	24.2	43.4
Persistent diarrhea	8.2	42.5	49.3

Table 3: Response of the teachers regarding risk factors of cervical cancer

Variables	Agree (%)	Disagree (%)	Not sure (%)
Human papillomavirus (HPV) infection	20.7	5.5	73.8
Smoking	59	17.9	23.1
Immunodeficiency	65.2	7.9	26.9
Long term use of the contraceptive pill	60.3	10.3	29.4
Chlamydia infection	19.7	7.2	73.1
Early marriage (below 17)	12	55.9	32.1
Having many children	12	55.9	32.1
Genetic/hereditary	54.2	22.4	23.4
Regular Pap smear tests	74.2	13.7	12.1

HPV: Human papillomavirus

DISCUSSION

Cervical cancer is one of the most common female genital cancers in Saudi Arabia and the second leading cause of cancer death worldwide, at the same time it is one of the most preventable cancers.^{1,2,4} This study was conducted among teachers in Al-Ahsa to determine their knowledge regarding cervical cancer. Most of the participate have inadequate knowledge about early signs and symptoms, risk factors and prevention of cervical cancer, on average 63.7% of the teachers were not aware of the early signs and symptoms 58.2% of the teachers do not have knowledge about the risk factors of cervical cancers. 66.2% of the teachers not aware of the availability of screening program in KSA. Most of the women 90% were not aware of the availability of a vaccine against cervical cancer, the study results revealed that Knowledge of cervical cancer symptoms, risk factors and screening program in KSA was greater among women aged 51-60 years and those who are married. More interestingly, we found that the teachers who graduated with high school degree had better knowledge about the early symptoms of cervical cancer and the screening program in KSA. In a descriptive cross-sectional study, Ssenyonjo (2013) reported that 57.3% of the respondents know about cervical cancer

risk factors and 46.8% know about the signs and symptoms.¹⁷ A study conducted by Ebu *et al.* in Elmina southern Ghana revealed that 31.6% of the respondents have heard about cervical cancer and only 2.3% have heard of the Pap smear test.¹⁸ However, Ombech *et al.* also reported a high level of awareness of cervical cancer in Nairobi Kenya where 87% of the female primary school teachers interviewed were aware of cervical cancer while 75% knew about the Pap smear test.¹⁹ There is a strong need to improve teachers' knowledge about cervical cancer symptoms, risk factors, screening program and vaccination. Teachers do not know enough about the main cervical cancer risk factors, particularly about the impact of early marriage (below 17) and having many children. Teachers are professional people and society take them as an elite group, and they are the port of entry to the adolescent group, they are in a better position to educate young girls under their domain and the society at large.

CONCLUSION

Therefore, it is important to increase their knowledge and then can be disseminated into the society and to the new generation to reduce the morbidity and mortality of cervical cancer.

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Serum Lipid Status in Subclinical Hypothyroidism

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Abstract

Introduction: Hypothyroidism, a thyroid deficient state, influences various metabolic pathways of our body. Subclinical hypothyroidism (SCH) is a condition of decreased thyroid stimulating hormone (TSH) secretion and presents with no significant clinical symptoms. The burden of SCH is increasing in the country with increasing iodine deficiency. Various studies have shown conflicting results regarding dyslipidemia in SCH, but many others have supported the finding of increased total cholesterol (TC), Low-density lipoprotein (LDL), Triglycerides (TGs), and very LDL (VLDL) in subclinical hypothyroid subjects when compared with euthyroid patients.

Materials and Methods: This study was conducted on 100 patients of SCH and 100 euthyroid. After 12 h of fasting venous, blood sample was collected from each participant and analyzed for thyroid profile (TSH, fT3, and fT4) and lipid parameters (TC, LDL, TG, VLDL, and HDL).

Results: TC, TG, and VLDL were significantly higher in SCH patients when compared to that of the control subjects ($P < 0.0001$). The mean value of TC/HDL and LDL/HDL ratio shows a significant difference, while mean value of HDL does not show significant difference between SCH patients and control subjects. All the lipid parameters were correlated with TSH values in SCH patients, using Pearson correlation coefficient, showing highest positive correlation low-density lipoprotein cholesterol ($r=0.252$) with TSH values.

Conclusions: Dyslipidemia is a more common in SCH compared to controls. Furthermore, there is TSH dependent increase in TC, LDL, VLDL, and TG levels. Regular screening of the society for the presence of thyroid disorder and dyslipidemia forms an important aspects in management of thyroid diseases.

Key words: Dyslipidemia, Euthyroid, Hypothyroidism, Metabolic, Subclinical hypothyroidism

INTRODUCTION

Thyroid disease is one of the chronic non-communicable diseases which is being increasingly diagnosed with greater awareness. This disease may result from either hyper or hyposecretion of tri-iodothyronine (T₃) and thyroxine (T₄) from thyroid gland. Hypothyroidism is found to be a common health issue in India, as well as in the worldwide, affecting women population predominantly though male one is not spared of it. It

has been estimated that approx. 200 million people are at the risk of development of iodine deficiency disease in our country.¹ OH is defined as a combination of high thyroid stimulating hormone (TSH) with low free thyroxine (fT₄), while subclinical hypothyroidism (SCH) is defined as a combination of high TSH with normal fT₄ levels.²

Among the elderly people, the incidence of SCH is more common in women than men, almost, twice.³ Worldwide prevalence of SCH is found to be 7.5-8.5% in women and 2.8-4.4% in men.⁴ According to an Indian epidemiological study prevalence of SCH is 8.73% in females and 7.17% in males.⁵ Patients of SCH are mostly asymptomatic or have minimal symptoms. Thus, SCH is solely a laboratory diagnosis.⁶ Although clinical diagnosis of thyroid dysfunction is suspected by the presence of a small swelling of the thyroid gland.

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Due to the effects of thyroid hormones on nearly all major metabolic pathways, the disease is associated with various metabolic abnormalities. It is well known that thyroid hormones and TSH affects synthesis, fate, and mobilization of lipids.⁷ Overt hypothyroidism (OH) leads to an increase in plasma cholesterol levels is well known.⁸ But in various previous studies, total cholesterol (TC), triglycerides (TGs) and low-density lipoprotein (LDL) have been shown to be elevated in SCH patients.^{9,10} On the contrary, do not support this finding.¹¹⁻¹³ Dyslipidemia is considered to be an important global health problem, particularly in the elderly population. Traditionally, it is considered a “natural phenomenon” with its high prevalence among elderly people. SCH is one of the most important risk factors for dyslipidemia.¹⁴ Thyroid hormones are involved in the expression of enzymes of lipid metabolism, thus, showing the development of qualitative and quantitative changes in thyroid diseases. Other metabolic abnormalities including hypertension, insulin resistance, and oxidative stress, which are themselves risk factors for other diseases, also coexists with dyslipidemia. Hence, Caparevic *et al.*, in his studies, observed that initial treatment of SCH patients with thyroxine may prevent the disease progression to OH, and slow down the progression of coronary heart disease, because of its beneficial effects on lipids.¹⁵ Thus, it may be a good practice to screen patients with hypothyroidism for evidence of metabolic syndrome and in preventing various other complications. The screening and treatment for SCH should be done as early as possible to prevent its adverse effects on lipid metabolism.

Hence, this study was aimed to estimate the levels of lipid parameters in patients with SCH and to see their relationship with TSH values.

MATERIALS AND METHODS

A case-control study was conducted in the Department of Clinical Biochemistry, IGIMS, Patna. Patients of 35 years and above belonging to both sexes, attending the Outpatient Department of Endocrinology, IGIMS, Patna, having one or more clinical manifestations of hypothyroidism, e.g., fatigue, weakness, loss of strength, loss of stamina, weight gain, coarse dry hair, dry, rough and pale skin, hair loss, cold intolerance, muscle cramps, frequent muscle aches, constipation, depression, irritability, memory loss, and in women abnormal menstrual cycle were recruited for the study.

These patients were screened for fT3, fT4, and TSH. 100 cases with raised TSH but normal fT3, fT4 were included in the study and evaluated further for lipid profile pertaining to TC, TGs, High density lipoprotein cholesterol

(HDL), and Low density lipoprotein-cholesterol (LDL-C). These were then compared with that of the 100 healthy controls of the same age and sex.

Under all aseptic and antiseptic precautions 5 ml blood sample after 12 h of fasting was drawn from the median cubital vein. Thyroid profile was estimated by Beckman Coulter assess 2 chemiluminiscense and serum TC, TG, LDL, and HDL by fully automated auto-analyzer AU 400 in both groups. Quality controls were done before analyzing all the parameters. Methods of estimating parameters: TC: Cholesterol oxidase - Peroxidase (POD) enzymatic method, TG: GPO-POD enzymatic method, HDL: Homogeneous enzymatic method.

Inclusion Criteria

About 100 newly diagnosed and untreated cases for SCH.

Exclusion Criteria

Known hypothyroidism cases, thyroidectomy cases, patient with external radiation, previous radioactive iodine therapy, consumption of drugs known to cause SCH, primary or secondary dyslipidemia, patients with diabetes mellitus, patients with other systemic illness, renal and hepatic failure cases, patients on statins, oral contraceptive pills and other medications that alter thyroid functions and lipid levels led to exclusion from the study. Pregnancy also accounted for exclusion from the study.

Statistical Analysis

Statistical analysis was performed using Graph pad Prism 5.0. Data obtained were presented as mean \pm SD. One-way analysis of variance (ANOVA) was applied to the result data of different groups of patients. Correlation of TSH with lipid parameters was done by Pearson correlation coefficient.

Results of the study were discussed at 95% confidence interval; interpretation of the test results was done according to p value ($P < 0.05$ - significant and $P \geq 0.05$ - not significant).

RESULTS

This study consists of 100 patients of SCH and 100 euthyroid patients. SCH group includes 55% of females as the majority while euthyroid group includes 77% males as majority (Figure 1). The mean age of the SCH subjects was 44.18 ± 7.12 years while that of the euthyroids was 45.93 ± 9.66 years ($P = 0.0167$). Serum TSH was given as 8.06 ± 2.01 $\mu\text{g/ml}$ and 2.79 ± 1.07 $\mu\text{g/ml}$ in SCH and euthyroid patients respectively with $P < 0.0001$. Levels of serum fT3 and fT4 were within the normal reference range and does not show a significant difference (Table 1).

Mean values of serum TC, TG and very LDL (VLDL) were significantly higher in SCH patients when compared to that of the control subjects ($P < 0.0001$) (Figure 2). Furthermore, mean value of LDL-C was higher in SCH patients ($P = 0.0205$).

Mean value of TC/HDL and LDL/HDL ratio show significant difference, while mean value of HDL does not show significant difference between SCH patients and control subjects (Table 2).

SCH patients were randomly divided into three age groups: Group-I (Age 36-44 years), Group-II (Age 45-54 years), and Group-III (Age 55-65 years). Values of lipid parameters among these groups were compared by one-way ANOVA (Table 3). The value of all the lipid parameters were correlated with TSH values in SCH patients, using Pearson correlation coefficient. Among all lipid parameters, LDL-C ($r=0.252$) shows highest positive correlation with TSH values (Table 4).

DISCUSSION

Thyroid disorders are among the most common endocrine disorders and usually alter lipid metabolism. In that SCH is more common than OH. It is being diagnosed more frequently with great awareness than OH these days.³ Pirich *et al.* reported an incidence of 1.1% for newly diagnosed SCH and no case of OH.¹⁰ Jung *et al.*, in his studies, reported a high incidence of SCH (0.64%) than that of

OH (0.16%).¹⁶ Similarly, Ravishekhar *et al.*¹⁷ reported the prevalence of SCH as 8.29%, and Tehrani *et al.*¹⁸ noted 21.2% of SCH cases in reproductive age group women. In our study, mean age of the SCH patients was 44.48 years. This finding was more or less similar with that of Raza Azad *et al.*¹⁹ and Sadariya *et al.*²⁰ Hallowell *et al.* showed max. Incidence of SCH in 40-60 years of age.²¹ In this study, SCH patients comprises 55% women and 36.7% men, which shows that SCH is more common in women than in men. This finding was consistent with that of many other studies.^{20,22,23} Sadariya *et al.*,²⁰ Sharma *et al.*,²² and Arem *et al.*²⁵ reported mean TSH value more or less similar with our findings. This study shows increase in the values of all lipid parameters except HDL as compared to that of the euthyroids. This finding was similar with that of a study conducted by Laway *et al.*⁹ According to Colorado study, patients with SCH had significantly higher TC and LDL-C concentrations when compared with euthyroid subjects.⁴ Sadariya *et al.* found that levels of all lipid parameters were significantly increased in SCH patients except increase in HDL which was not statistically significant.²⁰ In our study, TC/LDL ratio was significantly increased. A similar finding was observed by various studies: Sadariya *et al.*²⁰ and Adriana Santi *et al.*²⁶ Contrary to our observations, National Health and Nutrition Examination Survey III reported no significant differences in lipid parameters in SCH subjects

Table 1: Baseline characteristics among the SCH and euthyroid patients

Parameters	SCH (n=100)	Control (n=100)	P value
Age (years)	44.48±7.12	45.93±9.66	0.0167
TSH (µgm/ml)	8.06±2.01	2.79±1.07	<0.0001
FT4 (ng/dl)	0.87±0.30	0.87±0.30	<0.0001
FT3 (pg/ml)	3.02±0.43	3.02±0.43	0.0007

TSH: Thyroid stimulating hormone, FT4: Free thyroxine, FT3: Free triiodothyronine, SCH: Subclinical hypothyroidism

Table 2: Comparison of lipid parameters between subclinical hypothyroid patients and euthyroid patients

Parameter	SCH (n=100)	Control (n=100)	P value
TC	214.60±62.15	135.30±33.71	<0.0001
LDL	161.15±47.11	94.27±28.63	0.0205
HDL	40.63±7.18	44.11±7.72	0.0006
TG	184.54±71.09	125.57±28.70	<0.0001
VLDL	38.53±19.30	25.73±6.90	<0.0001
TC/HDL	5.42±1.76	3.19±1.14	<0.0001
LDL/HDL	4.07±1.36	2.24±0.96	>0.10

TC: Total cholesterol, TG: Triglyceride, HDL: High density lipoprotein, LDL: Low density lipoprotein, VLDL: Very low density lipoprotein, SCH: Subclinical hypothyroidism

Table 3: Comparison of study parameters in different groups

Parameter	Group A (36-44 years)	Group B (45-54 years)	Group C (55-64 years)	P value
Age	39.88±2.74	49.13±4.03	58.5±3.16	0.033
TSH	8.04±2.21	8.02±1.76	7.89±1.95	0.320
TC	208.71±57.88	220.22±67.94	213.83±46.40	0.344
LDL	152.85±46.61	174.44±48.04	157.31±25.98	0.190
HDL	39.89±7.94	41.45±6.23	42.77±3.93	0.043
TG	175.41±41.83	193.35±96.68	183.25±40.27	<0.0001
VLDL	38.65±7.94	38.77±19.24	32.21±9.61	0.112
TC/HDL	5.39±1.65	1.29±0.29	5.004±1.02	0.117
LDL/HDL	3.92±1.29	4.31±1.45	3.70±0.69	0.947

TC: Total cholesterol, TG: Triglyceride, HDL: High density lipoprotein, LDL: Low density lipoprotein, VLDL: Very low density lipoprotein, TSH: Thyroid stimulating hormone

Table 4: Correlation of TSH with lipid parameters in subclinical hypothyroidism

Parameters	TSH (µgm/dl)	
	Correlation "r"	P value
TC	0.245	0.014
LDL	0.252	0.011
HDL	0.041	0.680
TG	0.098	0.331
VLDL	-0.037	0.714
TC/HDL	0.185	0.064
LDL/HDL	0.185	0.034

TC: Total cholesterol, TG: Triglyceride, HDL: High density lipoprotein, LDL: Low density lipoprotein, VLDL: Very low density lipoprotein, TSH: Thyroid stimulating hormone

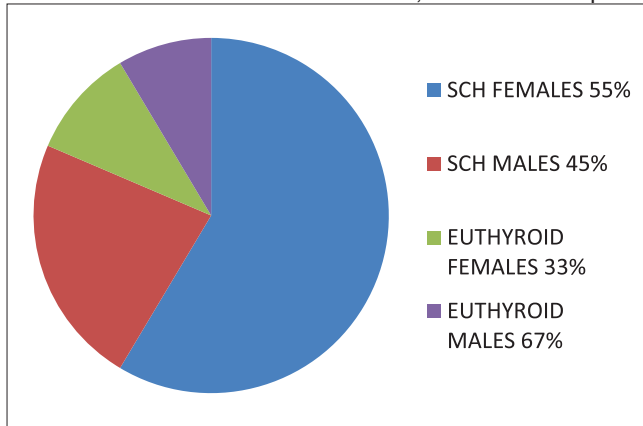


Figure 1: Sex wise distribution of patients

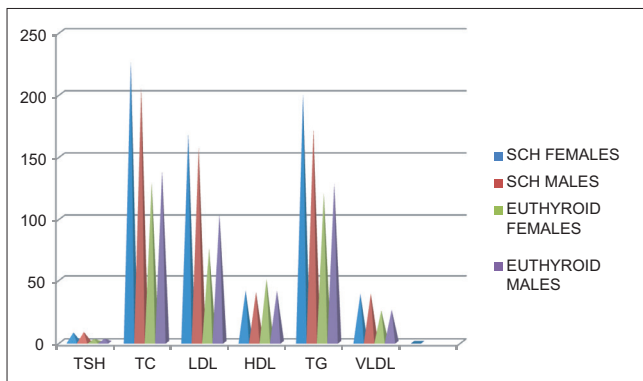


Figure 2: Lipid parameters in male and female of SCH and euthyroid patients

as compared to euthyroid individuals when adjusted for confounding variables.¹¹ In spite of high prevalence of SCH in elderly women Akbar *et al.* observed no increased risk of hypertension, hyperlipidemia or ischaemic heart disease in their sample.²⁷ The possible explanation for dyslipidemia here could be decreased LDL and IDL catabolism. This might either be due to reduction in cell surface receptor for LDL²⁸ or due to their decreased activity. This would increase TC and LDL concentration in blood. Moreover, decreased activity of hepatic lipase results in increase in the level of TG-rich lipoproteins; resulting in high concentration of VLDL and TG in blood. Thus, our study shows, TSH is positively correlated with values of all the lipid parameters estimated in SCH patients except VLDL, though it is not good correlation. Shashi *et al.*²⁹ found a similar correlation of TSH with values of TC, TG and LDL in SCH. In a study conducted by Ali Nouh *et al.*, it was shown that TSH was positively correlated with lipid profile values in cases with thyroid dysfunction.³⁰

CONCLUSION

From this study, it is concluded that there is dyslipidemia which is secondary in patients of SCH and is particularly

associated with increase in levels of TC, TG, LDL, VLDL, TC/HDL and LDL/HDL ratio. Due to apparently asymptomatic nature of illness, there is inconsistent reports about the prevalence of dyslipidemia in SCH among Indian Population. According to the American Thyroid Association, there is recommendation of routine screening of both sexes at 35 years of age, thereafter, every 5 years for the early diagnosis of SCH. This would, thus, aid in the early management of the disease. The findings of this study impress the fact that there is secondary dyslipidemia in SCH which may unfortunately contribute to risk of many disorders including cardio metabolic disorders. SCH is a matter of significant concern to the society as well as for the health-care professionals.

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Morphological Spectrum of Liposarcoma of Extremities: A Series of 13 Cases from A Tertiary Care Centre of North-East India

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Abstract

Introduction: Liposarcoma is the most common soft tissue sarcoma in adults. Liposarcoma normally presents as slowly enlarging, painless mass in middle-aged person; but some lesions grow rapidly and become ulcerated. They most frequently arise from deep-seated stroma, dermal lesions being rare. The anatomical distribution of liposarcoma appears to be partly related to the histologic type. Both anatomical location and histologic subtypes are partly responsible for outcome and prognosis in liposarcoma patients. Although, the tumor can occur in almost any part of the body, more than half of cases involve the thigh.

Materials and Methods: This is a retrospective study whereby, all liposarcoma of extremities diagnosed in the Department of Pathology, Gauhati Medical College, Assam, over a period of 6 years (January 2010 to December 2015) were retrieved from the archives and reviewed. Each case was analyzed with respect to age, sex, tumor location, size, histologic subtype, the presence of necrosis, and mitotic activity. Immunohistochemistry wherever available was recorded.

Results: A total of 13 cases of liposarcoma of extremities were diagnosed during the study period. The age ranged from 37 to 76 years with median age of 56.7 years. Out of the 13 cases, 9 were male and 4 female with male:female ratio being 2.3:1. Myxoid and/or round cell liposarcoma accounted for 8 cases (61.5%), atypical lipomatous tumor/well-differentiated liposarcoma (WDLS) accounted for 2 cases (15.3%), dedifferentiated liposarcoma 1 case (7.6%), and pleomorphic liposarcoma 2 cases (15.3%). The lower extremity was more commonly involved (10/13 cases).

Conclusion: Because liposarcoma is rare, commonly recurs, it cannot be overemphasised that patients require a multidisciplinary approach involving pathology for accurate diagnosis as histologic grade and subtype determines therapy, follow-up and prognosis.

Key words: Extremity, Liposarcoma, Soft tissue sarcoma

INTRODUCTION

Liposarcoma is a soft tissue sarcoma of adipocytic origin with various clinicopathologic subtypes characterised by distinct molecular/cytogenetic abnormalities. Liposarcoma, although rare, represents one of the most common types of soft tissue sarcoma of the extremities, second only to malignant fibrous histiocytoma and

followed by synovial Sarcoma.^{1,2} Liposarcoma of the extremity typically presents in the 5th to 7th decades of life with incidence decreasing in young and extremely rare in children.³ The anatomic distribution of liposarcoma appears to be closely related to histologic subtype. Myxoid/round cell liposarcoma and pleomorphic liposarcoma have a predilection for the extremities, whereas well-differentiated liposarcoma (WDLS) occurs predominantly in the retroperitoneum.

Tumor site, size, grade, and histologic subtype are significant in dictating patient prognosis. Limb tumors carry a better prognosis than retroperitoneal tumors.

Four main forms of liposarcoma are recognised - atypical lipomatous tumor/WDLS, dedifferentiated liposarcoma,

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myxoid/round cell liposarcoma, and pleomorphic liposarcoma.⁴ The subclassification of liposarcoma has a dramatic prognostic significance, while tumors in the spectrum of atypical lipomatous tumor/WDLS only carry a risk of a local recurrence and possible dedifferentiation, the pleomorphic liposarcomas are high-grade malignancies with a very high risk of metastatic disease.⁴

MATERIALS AND METHODS

The study is a hospital-based retrospective study conducted in the Department of Pathology, Gauhati Medical College, Assam. All cases of liposarcoma of extremities with available formalin fixed, paraffin embedded tissue were selected from surgical pathology records between January 2010 and December 2015. The tumors were classified as upper extremity if it was beyond shoulder joint and lower extremity if it was beyond hip joint. All retroperitoneal, abdominal, groin, and pelvic liposarcomas were excluded from the study. Nature of the specimen was excisional/incisional biopsy (12 cases) and outside slides and blocks for review (1 case). Out of these, 12 were primary tumors and one was a recurrence. The patient characteristics (age and sex), tumor characteristics (site, size, histologic subtype, necrosis, and mitotic activity) were analyzed in these cases. Tissues were received in 10% formalin, processed routinely with hematoxylin and eosin staining and diagnosis based on the histopathologic examination. Immunohistochemistry for S-100, vimentin and MDM2 were performed for confirmation of diagnosis wherever required.

RESULTS

A total of 13 cases of liposarcoma of extremities were reported during the 6-year study period. The age range of the patients was 37-76 years with a median age of 56.7 years. Out of 13 cases, 9 cases were male and 4 cases were female with a male:female ratio of 2.3:1.

Regarding the site, the lower extremity was involved in 10 cases and upper extremity in 3 cases. In the case of lower extremity, 8 were in the thigh, 1 in popliteal fossa, and 1 in foot. In the case of upper extremity, 2 cases were located in arm and in thumb presenting as a recurrent mass (Table 1). The tumor size ranged from 8 cm to 27.5 cm with a mean size of 15.6 cm. The most common histologic type was myxoid and/or round cell liposarcoma (8 cases) followed by atypical lipomatous tumor/WDLS (2 cases), pleomorphic liposarcoma (2 cases), and dedifferentiated liposarcoma (1 case) (Table 1).

DISCUSSION

Liposarcoma, first described by Virchow in 1860s, is one of the most common soft tissue sarcomas of adult life, the relative incidence among other sarcomas ranging from 9.8% to 16%.⁵ Its principal histologic subtypes are entirely separate disease entities with different morphology, genetics, and natural history.⁶

The recent WHO classification of soft tissue tumors recognises the following categories of liposarcoma: (1) Atypical lipomatous tumor/WDLS, (2) dedifferentiated liposarcoma, (3) myxoid/round cell liposarcoma, and (4) pleomorphic liposarcoma. The concept of round cell liposarcoma represents the high-grade counterpart of myxoid liposarcoma is generally accepted. The advent of cytogenetics and molecular investigations has contributed to better categorisation of this subset of mesenchymal neoplasms. Not only have they provided new insights into the histology of these tumors but they have also validated current classification schemes based on conventional morphologic observations.^{7,8} Although liposarcoma can occur almost anywhere in the body, the extremities are a favoured site, especially the thigh region. This study was, therefore, conducted to study the morphologic spectrum of liposarcoma in the extremities.

Atypical lipomatous tumor/WDLS are synonyms describing tumors that are identical morphologically, karyotypically and in terms of histologic behavior but determined by tumor location and resectability.⁶ It occurs most frequently in the deep soft tissues of the limbs, especially the thigh. They occur in middle-aged adults with a peak incidence in 6th decade.⁶ We found 2 cases of atypical lipomatous tumor/WDLS, one each in the 6th and 7th decade. Male and females are equally affected. In our study, both cases were females and were located in the thigh. Grossly, they were 21 cm and 18.6 cm in size, yellow with whitish areas. Microscopically, tumor consisted of mature fat separated by fibrous septa. Variably sized adipocytes with spindle cells having hyperchromatic nuclei and scattered multivacuolated lipoblasts were noted. The recognition of lipoblasts is key to the diagnosis of liposarcoma. The characteristic morphologic features are well-demarcated cytoplasmic lipid that causes indentations in an irregular hyperchromatic nucleus and creates a scalloping of the nuclear membrane.⁵ Small floret-like cells was noted in 1 case. Immunohistochemistry plays a very minor role in the differential diagnosis of atypical lipomatous tumor/WDLS.⁶ The defining genetic features of atypical lipomatous tumor/WDLS cells are supernumerary ring and rod chromosomes that contain amplification of 12q14 - 15 region including the MDM2

Table 1: The complete data of 13 cases

Number	Age (years)	Sex	Site	Specimen	IHC ^s	Diagnosis
1	66	Male	Lower extremity (thigh)	Excision biopsy	Not done	WDLS*
2	53	Female	Lower extremity (thigh)	Excision biopsy	Not done	Myxoid LS**
3	45	Male	Lower extremity (thigh)	Excision biopsy	Not done	Myxoid LS
4	59	Male	Lower extremity (thigh)	Excision biopsy	Not done	Pleomorphic LS
5	52	Female	Upper extremity (arm)	Incision biopsy	Not done	Myxoid LS
6	60	Male	Lower extremity (thigh)	Excision biopsy	Not done	Myxoid/round cell LS
7	76	Female	Lower Extremity (thigh)	Excision biopsy	Not done	WDLS*
8	61	Female	Upper extremity (arm)	Excision biopsy	Not done	Myxoid LS
9	67	Male	Lower extremity (thigh)	Slide and block review	S-100 (+) Vimentin (+)	Pleomorphic LS
10	49	Male	Lower extremity (popliteal fossa)	Excision biopsy	Not done	Myxoid/round cell LS
11	55	Male	Upper extremity (thumb)	Amputated thumb	S-100 (+) Vimentin (+) MDM2 (+)	Dedifferentiated LS
12	37	Male	Lower extremity (foot)	Excision biopsy	S-100 (+) Vimentin (+)	Myxoid LS
13	57	Male	Lower extremity (thigh)	Excision biopsy	Not done	Myxoid LS

*WDLS: Well differentiated liposarcoma, **LS: Liposarcoma, ^sIHC: Immunohistochemistry

gene. The most important prognostic factor in this subtype is an anatomic location with overall mortality ranging from 0% for atypical lipomatous tumor of extremities to more than 80% for WDLS of retroperitoneum.⁹

Dedifferentiated liposarcoma: Dedifferentiation or histologic progression to a higher grade, less well-differentiated neoplasm was first described by Dahlin.¹⁰⁻¹² Dedifferentiated liposarcoma develops in the same age group as atypical lipomatous tumor/WDLS reaching a peak during the early 7th decade. The retroperitoneal location is a favoured site of this subtype. <01% occur in subcutaneous site.⁵ We retrieved 1 case of dedifferentiated liposarcoma of the thumb. The patient was 55 years, male with recurrent thumb mass. Grossly, specimen consisted of amputated thumb (Figure 1). Cut section was fleshy, whitish - yellow with destruction of underlying bone. Microscopic examination showed features of WDLS juxtaposed to areas of a high grade pleomorphic undifferentiated sarcoma (Figure 2). Immunohistochemistry for S - 100 was positive in well-differentiated areas and MDM2 was positive in dedifferentiated areas (Figure 3). An extensive review of literature shows that dedifferentiated liposarcoma of the thumb is very rare with only one reported case of de - novo subungual right thumb liposarcoma with brain metastasis.¹³ Dedifferentiated areas may be high grade or low grade and are generally non lipogenic. Dedifferentiated liposarcoma, despite its high-grade morphology, exhibits a less aggressive clinical course than other subtypes of high-grade pleomorphic sarcoma.^{12,14,15} Recent studies have shown that some dedifferentiated liposarcoma can show lipoblastic differentiation in the dedifferentiated, high-grade component, resulting in areas indistinguishable from pleomorphic liposarcoma, leading to consideration of revision of initial criteria for its diagnosis.^{16,17}



Figure 1: Specimen of amputated thumb showing fleshy, whitish - yellow cut surface (Dedifferentiated LS case)

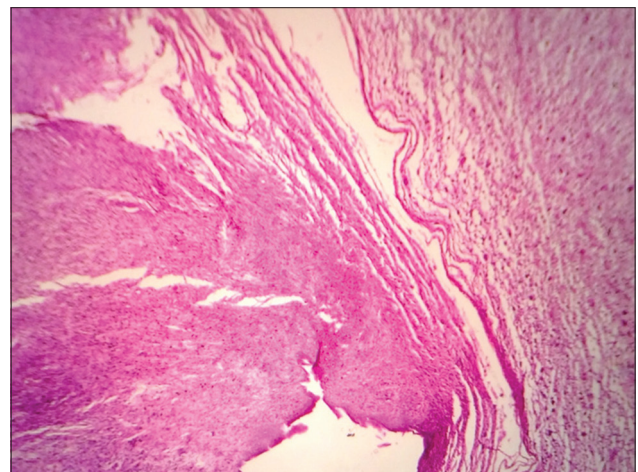


Figure 2: Low power view of dedifferentiated liposarcoma showing the pleomorphic undifferentiated component in the left side and the WDLS component in the right

Myxoid/round cell liposarcoma: Although myxoid liposarcoma typically occurs in middle-aged people, it is the most common type of liposarcoma in adolescents and young

adults. Myxoid liposarcoma has a predilection for the lower extremity and most frequently manifests as a multinodular, gelatinous mass.⁵ In our study, 8 cases of myxoid and/or round cell liposarcoma were identified of which 6 cases were in lower extremity and 2 cases in upper extremity (Table 1). 2 patients were female and 6 male. Grossly, tumor size ranged from 11 cm to 21.5 cm (Figure 4). Microscopic examination showed lobules of bland, relatively uniform, spindled to ovoid cells in an abundant myxoid matrix with a prominent, delicate plexiform capillary network (Figure 5). Univacuolated and multivacuolated lipoblasts were seen. Mitotic activity was scant and areas of necrosis noted in 3 cases. 2 tumors showed significant areas of increased cellularity formed by cells having large, relatively uniform hyperchromatic nuclei, and scant eosinophilic cytoplasm (Figure 6) indicative of round cell differentiation.

Round cell liposarcoma is a poorly differentiated form of myxoid liposarcoma. Studies have shown that a round cell component of >5%, portends a higher risk of metastasis or death from disease.¹⁸

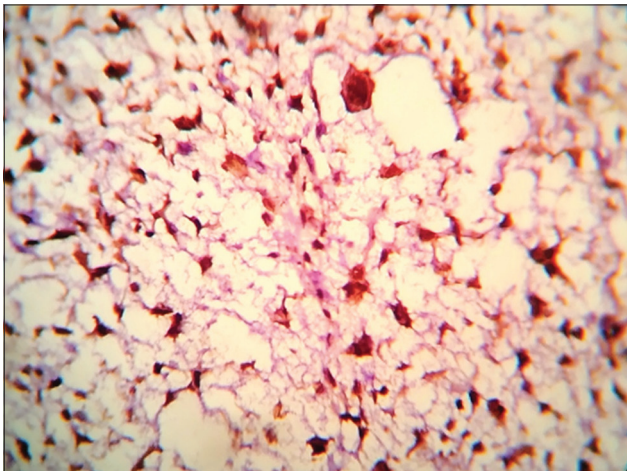


Figure 3: High power view of IHC showing nuclear positivity of MDM2 in the case of dedifferentiated liposarcoma



Figure 4: Showing the gross picture of myxoid liposarcoma

Pleomorphic liposarcoma: Pleomorphic liposarcoma is uncommon and rarely occurs in skin and subcutis.¹⁹ They are most often located on an extremity, trunk and head and neck region. It may be evident as a painless, pedunculated, pink papulonodule.²⁰ Pleomorphic liposarcoma is the rarest subtypes of liposarcoma and is discriminated from the other high-grade sarcomas by the presence of pleomorphic lipoblasts.⁵ In our study, 2 cases of pleomorphic liposarcoma located in the lower extremity, both elderly males were seen. Grossly, tumor size was 15.7 cm and 19.6 cm. Tumors were firm, nodular masses with white to yellow cut surface. Histologically, they were composed of sheets of predominantly pleomorphic spindled cells with variable numbers of pleomorphic lipoblasts (Figure 7). Necrosis was seen and mitotic count ranged from 3 to 6/10 hpf. The majority of pleomorphic liposarcomas resemble other high-grade pleomorphic sarcomas. As emphasised by Fletcher,²¹ recognition of this subtype requires careful attention to light microscopic detail. The recognition of pleomorphic lipoblasts is the sine

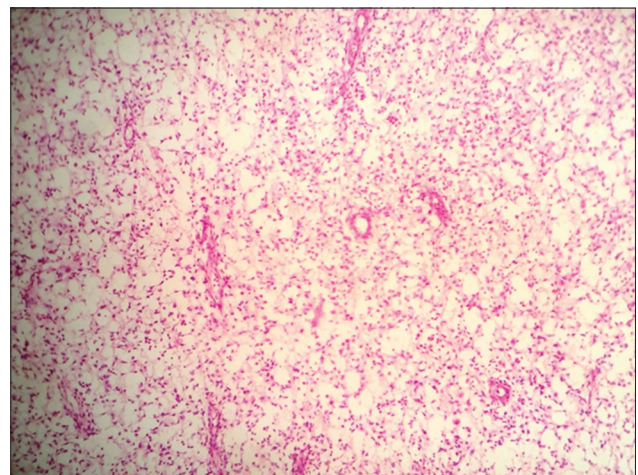


Figure 5: Low power view of myxoid liposarcoma showing the myxoid matrix and the prominent plexiform capillary network

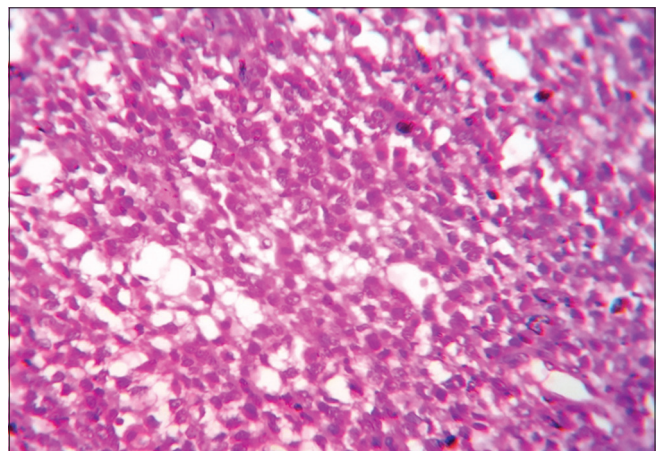


Figure 6: High power view of round cell liposarcoma showing the round cell morphology and the lipoblasts

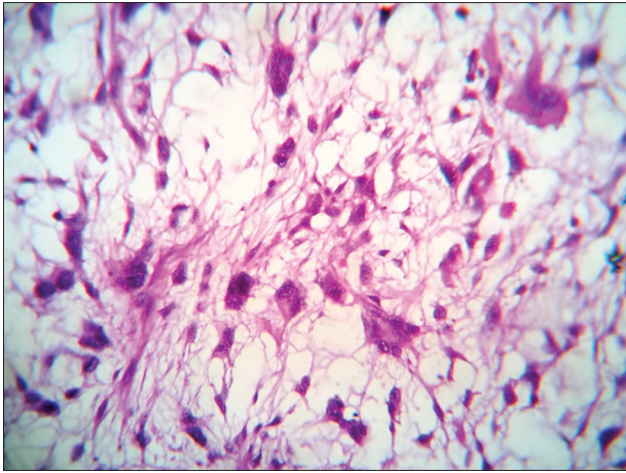


Figure 7: Low power view of pleomorphic liposarcoma showing pleomorphic lipoblasts and the pleomorphic spindled cells

qua non for identification of pleomorphic liposarcoma; immunohistochemical stains are more helpful in excluding other types of pleomorphic sarcomas than confirming a diagnosis of pleomorphic liposarcoma.²²

CONCLUSION

The morphologic spectrum of liposarcoma and its subtypes is broad and often underappreciated. Awareness of the diverse histologic appearance and anatomic localization of the various subtypes combined with a robust diagnostic approach are necessary to arrive at a correct diagnosis.

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Prevalence of Metallo-beta-lactamase Production in Imipenem-resistant *Pseudomonas* in Tertiary Care Center at Kota Region

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Abstract

Introduction: *Pseudomonas* spp. is common cause of nosocomial infection. Metallo-beta-lactamase (MBL) production is an important cause of antimicrobial drug resistance in *Pseudomonas*. Determination of their prevalence is essential to form an effective antibiotic policy and for prevention of their spread in hospital and community.

Objective: To detect the prevalence of MBL production in imipenem-resistant *Pseudomonas* isolated from different clinical samples and their antibiotic sensitivity profile.

Methods: *Pseudomonas* isolates from various clinical samples were subjected to antibiotic susceptibility testing by Kirby-Bauer disc diffusion method according to Clinical and Laboratory Standards Institute guidelines. Imipenem-resistant *Pseudomonas* isolates were further processed for MBL detection by combined disc synergy test (CDST) and double disc synergy test (DDST) with imipenem.

Result: Among 7493 processed clinical specimens, 202 *Pseudomonas* spp. were isolated. Of these, a total of 73 *Pseudomonas* spp. was found resistant to imipenem. 69 (94.52%) imipenem-resistant *Pseudomonas* isolates were positive for MBL by CDST-imipenem-EDTA (CDST-IPM) method, whereas 65 (89.04%) were positive by DDST-IPM method, respectively. MBL positive *Pseudomonas* was most prevalent in pus (36.23%). MBL-producing *Pseudomonas* was most susceptible to piperacillin-tazobactam combination (43.48%). All MBL-producing *Pseudomonas* isolates were resistant to ceftriaxone.

Conclusion: MBL-producing *Pseudomonas* was highly prevalent in Kota region, which is one of the major causes of resistance to imipenem and other antimicrobial agents. There is a requirement of regular surveillance and strict antibiotic policy to fight against these multi-drug resistant pathogens.

Key words: Carbapenem resistance, Combined disc synergy test-imipenem-EDTA, DDST-imipenem-EDTA, Metallo-beta-lactamase, *Pseudomonas aeruginosa*

INTRODUCTION

The aerobic pseudomonads are rod-shaped, Gram-negative, oxidase-positive bacteria, motile using one or more polar flagella.¹ *Pseudomonas aeruginosa* is a virulent agent having a tendency to develop resistance to the majority

of the antibiotics available for treatment. It is a leading cause of life-threatening nosocomial infection. Its intrinsic resistance to many antimicrobial agents and development of multidrug resistance impose severe therapeutic problem for clinicians.²

The rapid and irrepressible increase in antimicrobial resistance of pathogenic bacteria are widely accepted as a major problem that has been observed over the last decade.³ Among the β -lactams, carbapenems are potent agents for the serious treatment of Gram-negative bacterial infections. These antibiotics are well-suited to this use because of their broad spectrum activity and resistance to hydrolysis by most β -lactamases, including the extended-spectrum

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β -lactamases (ESBL).⁴ Carbapenem resistance has been observed frequently in non-fermenting bacilli *P. aeruginosa* and *Acinetobacter* spp.⁵ Resistance to carbapenem is due to decreased outer membrane permeability, increased efflux systems, alteration of penicillin-binding proteins, and carbapenem-hydrolyzing enzymes-carbapenemase.⁶

β -lactamases are classified into four molecular classes, A, B, C, and D, based on conserved and distinguishing amino acid motifs. Classes A, C, and D include enzymes that hydrolyze their substrates by forming an acyl-enzyme through an active site serine, whereas class B β -lactamases are metallo enzymes that utilize at least one active-site zinc ion to facilitate β -lactam hydrolysis.⁷ Due to this zinc dependency, chelators such as EDTA inhibit metallo-beta-lactamase (MBL) activity.⁸

Acquired MBL has recently emerged as one of the most worrisome resistance mechanisms owing to their capacity to hydrolyze all β -lactams including carbapenems with the exception of aztreonam. Because their genes are carried on highly mobile elements, allowing easy dissemination. Such strains are not susceptible to therapeutic serine β -lactamase inhibitors (such as clavulanate and sulfones).⁹

MATERIALS AND METHODS

The present study was conducted in the Department of Microbiology, Government Medical College, Kota, Rajasthan, from November 2014 to October 2015.

Pseudomonas spp. isolated from various clinical specimens, such as urine, pus, respiratory secretions, body fluids, and cerebrospinal fluid (CSF), of patients attending Outpatient Department (OPD) or Inpatient Department (IPD) of MBS Hospital and associated group of hospitals were processed for the study.

Organisms grown were identified by their:

- Motility testing by hanging drop method
- Colony characteristics on solid media
- Gram's staining of the isolated colonies
- Battery of biochemical reactions including: Oxidase test, triple sugar iron (TSI) test, oxidation fermentation test, urease test, indole production, citrate test, and decarboxylation of amino acids.

All the non-duplicate *Pseudomonas* isolated during study were subjected to antimicrobial susceptibility testing by the Kirby-Bauer disc diffusion method for cefotaxime (30 μ g), ceftazidime (30 μ g), ceftriaxone (30 μ g), cefepime (30 μ g), gentamicin (10 μ g), amikacin (30 μ g), imipenem (10 μ g), ciprofloxacin (5 μ g), piperacillin (100 μ g) and piperacillin-tazobactam (100/10 μ g). All discs were procured

commercially from Hi-media laboratory limited, India. The zone diameter was measured and interpreted according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Isolates resistant to imipenem were considered screening positive. Then, the isolates were further tested for MBLs production by combined disc synergy test (CDST) using imipenem and EDTA (CDST-IPM) and double disc synergy test (DDST) using IPM and EDTA (DDST-IPM).

CDST-IPM

The IPM CDST was performed as described by Yong *et al.* The test organisms were inoculated on Mueller-Hinton agar as recommended by the CLSI. A 0.5 M EDTA solution was prepared by dissolving 18.61 g of EDTA in 100 ml of distilled water and adjusting its pH 8.0 by using NaOH. The mixture was sterilized by autoclaving. Two imipenem (10 μ g) discs were placed on the surface of an agar plate at distance of 25 mm and 10 μ l EDTA solution added to one of them to obtain the desired concentration of 750 μ g. The zones of inhibition of imipenem and IPM discs were compared after 16 to 18 hrs of incubation in air at 35°C. In the combined disc test, if the increase in inhibition zone with the imipenem and IPM disc was ≥ 7 μ m than the imipenem alone, it was considered MBL positive (Figures 1-3).¹⁰

DDST-IPM

Test strains were adjusted to the McFarland 0.5 standard and used to inoculate Mueller-Hinton agar plates. Depending on the test, a 10 μ g imipenem disc or a 30 μ g ceftazidime disc was placed on the plate, and a blank filter paper disc was placed at a distance of 10 mm (edge to edge). To the blank disc 10 μ l of a 0.5 M EDTA (750 μ g) solution was added. After overnight incubation, the presence of even a small synergistic inhibition zone was interpreted as positive (Figures 1-3).¹¹

RESULTS

During the study period, a total of 7493 clinical specimens were processed out of which 202 *Pseudomonas* spp. were recovered. Of these, a total of 73 *Pseudomonas* spp. were found resistant to imipenem. Imipenem-resistant *Pseudomonas* spp. was most commonly isolated from pus (38.35%) followed by urine (30.14%), respiratory secretions (12.33%), body fluid (12.33%), and CSF (6.85%), respectively (Table 1, Figure 4). Maximum prevalence of imipenem-resistant *Pseudomonas* was observed in 21-40 years age group (30.14%). IPD:OPD ratio was 1.81:1.

Maximum number of imipenem-resistant *Pseudomonas* isolates were susceptible to piperacillin-tazobactam combination (43.83%) followed by ciprofloxacin (32.88%), amikacin (23.29%), gentamicin (23.29%), piperacillin (9.59%), cefepime (5.48%), cefotaxime (4.11%), ceftazidime (4.11%), and ceftriaxone (1.37%), respectively (Table 2, Figure 6).

Out of 73 imipenem-resistant *Pseudomonas* isolates, 69 (94.52%) were positive for MBL by CDST-IPM method, whereas 65 (89.04%) were positive by DDST-IPM method, respectively (Table 3). MBL positive *Pseudomonas* was most prevalent in pus (36.23%) followed by urine (31.89%), respiratory secretions (11.59%), body fluid (13.04%), and CSF (7.25%), respectively (Table 1, Figure 5). MBL positive *Pseudomonas* was most prevalent in 21-40 years age group (31.88%). IPD:OPD ratio for MBL-producing *Pseudomonas* was 2:1.

MBL-producing *Pseudomonas* was most susceptible to the piperacillin-tazobactam combination (43.48%) followed by ciprofloxacin (33.33%), gentamicin (21.74%), amikacin (20.29%), piperacillin (8.70%), ceftazidime (2.90%), cefepime (1.45%), and cefotaxime (1.45%), respectively.

Table 1: Sample-wise distribution of imipenem-resistant and MBL-producing *Pseudomonas*

Type of sample	Number of imipenem-resistant <i>Pseudomonas</i> (n=73) (%)	Number of MBL positive <i>Pseudomonas</i> (n=69) (%)
Pus	28 (38.35)	25 (36.23)
Urine	22 (30.14)	22 (31.89)
Respiratory secretions	9 (12.33)	8 (11.59)
Body fluids	9 (12.33)	9 (13.04)
CSF	5 (6.85)	5 (7.25)
Total	73 (100)	69 (100)

MBL: Metallo-beta-lactamase, CSF: Cerebrospinal fluid

Table 2: Antibiotic susceptibility pattern of MBL-producing *Pseudomonas*

Antibiotic (concentration µg/disc) (HIMEDIA)	Sensitivity of imipenem-resistant <i>Pseudomonas</i> (n=73) (%)	Sensitivity of MBL positive <i>Pseudomonas</i> (n=69) (%)
Amikacin (30)	17 (23.29)	14 (20.29)
Gentamicin (10)	17 (23.29)	15 (21.74)
Ceftazidime (30)	3 (4.11)	2 (2.90)
Cefotaxime (30)	3 (4.11)	1 (1.45)
Ceftriaxone (30)	1 (1.37)	0 (0.00)
Cefepime (30)	4 (5.48)	1 (1.45)
Ciprofloxacin (5)	24 (32.88)	23 (33.33)
Piperacillin (100)	7 (9.59)	6 (8.70)
Piperacillin-Tazobactam (100/10)	32 (43.83)	30 (43.48)

MBL: Metallo-beta-lactamase

Table 3: Prevalence of MBL in imipenem-resistant *Pseudomonas* spp.

Number of imipenem-resistant <i>Pseudomonas</i> (%)	MBL positive <i>Pseudomonas</i> (%)	
	By CDST-IPM method (n=73)	By DDST-IPM method (n=73)
73 (100)	69 (94.52)	65 (89.04)

MBL: Metallo-beta-lactamase, CDST-IPM: Combined disc synergy test- imipenem-EDTA, DDST-IPM: Double disc synergy test-imipenem-EDTA

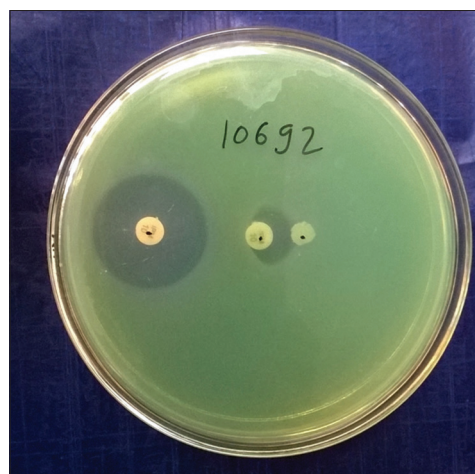


Figure 1: Metallo-beta-lactamase positive by both combined disc synergy test-imipenem-EDTA (IPM) and double disc synergy tests-IPM method

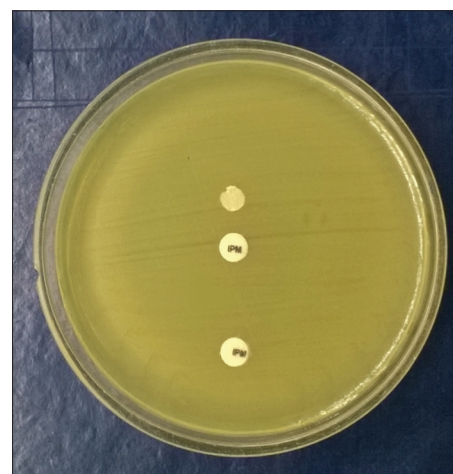


Figure 2: Metallo-beta-lactamase negative by both combined disc synergy test-imipenem-EDTA (IPM) and double disc synergy test-IPM method

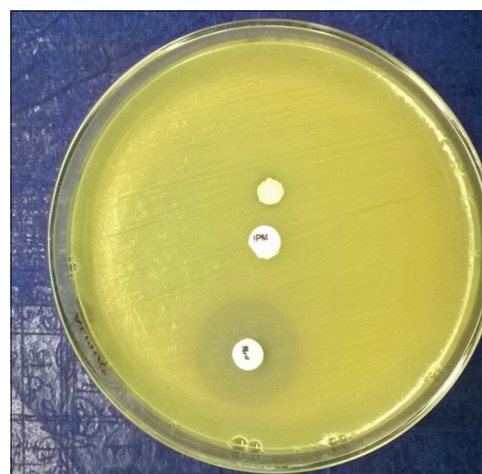


Figure 3: Metallo-beta-lactamase positive by combined disc synergy test-imipenem-EDTA (IPM) and negative by double disc synergy test-IPM method

All MBL-producing *Pseudomonas* isolates were resistant to ceftriaxone (Figure 7).

DISCUSSION

Imipenem-resistant *P. aeruginosa* is a current and significant concern, especially because of the limited therapeutic options for this pathogen. MBL enzymes may play a critical role in imipenem resistance in *P. aeruginosa*.⁴ Multiple beta-lactamase-producing *P. aeruginosa* can cause major therapeutic failure and poses a significant clinical challenge if remain undetected. Therefore, early identification of the infections due to these microorganisms is necessary as the appropriate treatment might reduce the spread of these resistant strains as well as the morbidity and mortality in hospitalized patients. This emphasizes the need for the detection of isolates that produce these enzymes to avoid therapeutic failures and nosocomial outbreaks.¹²

Since there are no standard guidelines for detection of MBL, different studies have reported the use of different methods. PCR analysis is the gold standard method for the detection of MBL production, but it is not feasible in the routine microbiology laboratory.¹³ A few studies have reported that “CDST-IPM method” as the most sensitive method for detection of MBL production in Gram-negative bacilli.^{13,14} Hence, this method was used in this study in association with “IPM DDST” for detection of

the prevalence of MBL production in imipenem-resistant non-fermentative Gram-negative bacilli.

In the present study, imipenem-resistant *Pseudomonas* was most commonly isolated from pus (38.35%) which is comparable with the study of Attal *et al.*¹⁵ (43.7%). In the study of Anita Nandi *et al.*² (59.08%) and Dr. Khakhkhar *et al.*,⁶ 61.53% of the imipenem-resistant *Pseudomonas* was isolated from pus in much higher percentage. However, in the study of Roberto Morais *et al.*¹⁶ and Smita Sood *et al.*,¹⁷ imipenem-resistant *Pseudomonas* was most commonly isolated from respiratory secretions, 52.7%, and 39.13%, respectively, whereas in the present study, 12.33% of the imipenem-resistant *Pseudomonas* was isolated from respiratory secretions.

There is wide variation in antibiotic sensitivity pattern in all studies, which may be due to the selective pressure of antibiotic used in the particular area. Sensitivity pattern of imipenem-resistant *Pseudomonas* in the present study is comparable with the study of Khakhhar *et al.*¹⁶ for amikacin (26.92%) and with the study of Maria *et al.*⁴ for Piperacillin-tazobactam (47.80%) and gentamicin (34.80%) to some extent.

P. aeruginosa-producing MBL was first reported in India in 2002.¹⁸ In the present study, 94.52% and 89.04% of the *Pseudomonas* were MBL producer by CDST-IPM and DDST-IPM method, respectively, which is comparable to

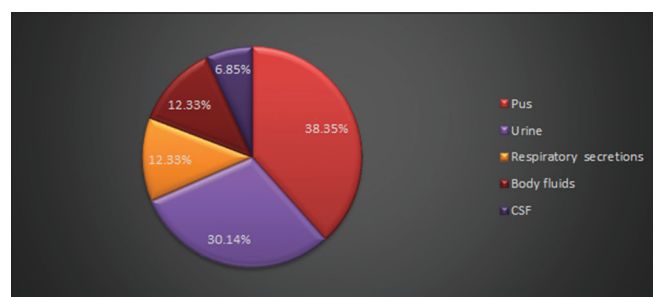


Figure 4: Sample-wise distribution of imipenem-resistant *Pseudomonas*

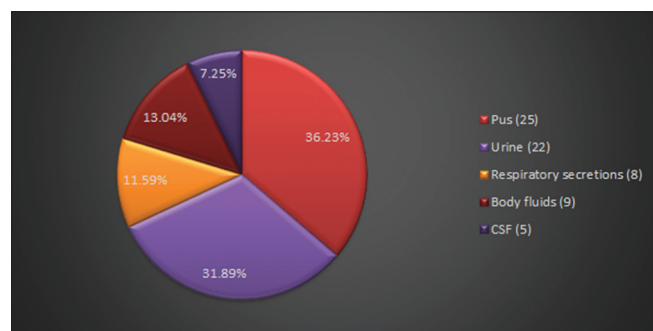


Figure 5: Sample-wise distribution of metallo-beta-lactamase positive *Pseudomonas*

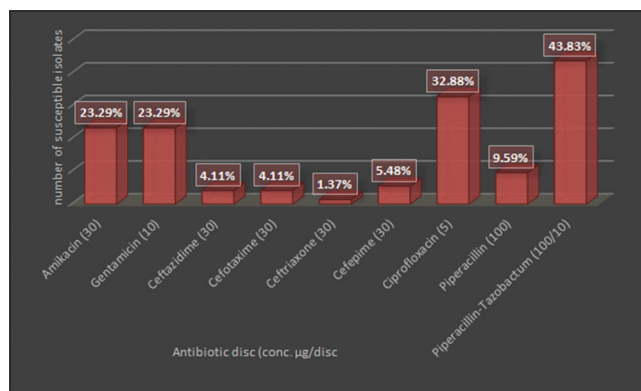


Figure 6: Antibiotic susceptibility pattern of imipenem-resistant *Pseudomonas*

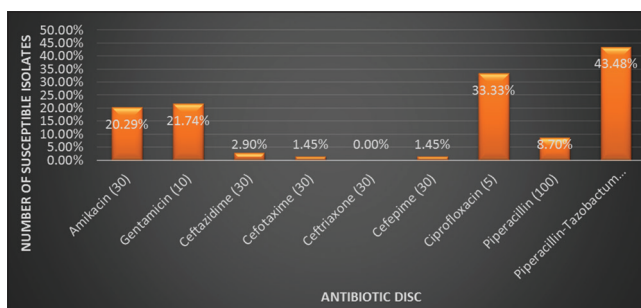


Figure 7: Antibiotic susceptibility pattern of metallo-beta-lactamase-producing *Pseudomonas*

study of Sood *et al.*¹⁷ (100%), Irfan *et al.*¹⁹ (100%), Attal *et al.*¹⁵ (88.89%), and Fam *et al.*³ (87.5%).

In present study, MBL-producing *Pseudomonas* was most commonly isolated from pus (36.23%), which is comparable with the study of Attal *et al.*¹⁵ (43.7%) but also in study of Dr. Khakhkhar *et al.*⁶ and Anita Nandi *et al.*² MBL-producing *Pseudomonas* was much more commonly isolated from pus (66.67% and 62.75%, respectively), while in study of Smita Sood *et al.*¹⁷ and Sangeetha *et al.*²⁰ MBL-producing *Pseudomonas* was most commonly isolated from respiratory secretions (39.13% and 35.29%, respectively) and in study of Dr. Wankhede *et al.*²¹ MBL-producing *Pseudomonas* was most commonly isolated from urine (44.12%).

There is wide variation in antibiotic susceptibility pattern of MBL-producing *Pseudomonas* in different studies. In present study, MBL-producing *Pseudomonas* was most susceptible to piperacillin-tazobactam combination (43.48%). In a study of Maria *et al.*⁴ and Ami Varaiya *et al.*⁵ 76.2% and 84% of the MBL-producing *Pseudomonas* were sensitive to this combination which was much higher than the present study. Sensitivity pattern of present study for amikacin was comparable with study of Roberto Morais *et al.*¹⁶ (22.2%) and Dr. Vipul M Khakhkhar *et al.*⁶ (20%).

CONCLUSION

MBL-producing *Pseudomonas* was highly prevalent in Kota region, which is one of the major causes of resistance to imipenem and other antimicrobial agents. In the absence of novel agents in the future, the spread of MBL producers may lead to the therapeutic dead end. Early detection may avoid the spread of these multi-drug resistant isolates and may help to maintain first- and second-line therapies and reduction of morbidity and mortality rates. There is a requirement of regular surveillance and strict antibiotic policy to fight against these multi-drug resistant pathogens.

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Comparative Study of Effects of Sevoflurane versus Propofol-based Anesthesia on Intraoperative Maintenance of Hemodynamics and Recovery Characteristics in Patients Undergoing Modified Radical Mastectomy

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Abstract

Background: The need for maintenance of hemodynamic parameters and rapid emergence poses a dynamic clinical challenge for anesthesiologists. We studied and compared the effects of sevoflurane inhalational anesthesia with propofol intravenous anesthesia for maintenance of intraoperative hemodynamics, recovery characteristics, and any adverse effects in patients undergoing modified radical mastectomy.

Materials and Methods: After approval from the Institutional Ethical Committee and proper patient consent, 100 adult patients of American Society of Anesthesiologists Grade I and II were randomly allocated into two groups (50 each) using chit in box method. Group A was maintained with 1-4% sevoflurane with 60% nitrous oxide in oxygen, and Group B was maintained with injection propofol infusion 50-150 ug/kg/min with 60% nitrous oxide in oxygen to maintain a bispectral index (BIS) value of 40-60. Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), SpO₂, ET CO₂, and BIS were recorded intraoperatively and at the end of surgery. Emergence time, extubation time, recovery time, and any adverse event were also noted. Quantitative data was analyzed using two paired and un-paired student *t*-tests. Qualitative data was analyzed using Chi-square or Fisher's exact test.

Results: HR, SBP, DBP, and MAP were more stable in sevoflurane group intraoperatively. In propofol group, HR was significantly lower ($P = 0.000$), and MAP, DBP, and SBP were significantly higher intraoperatively. Emergence time, extubation time, and recovery time ($P = 0.000$) were much smaller in sevoflurane group. Shivering was reported in 12 patients in propofol group.

Conclusion: Sevoflurane anesthesia provides more stable intraoperative hemodynamics and rapid recovery as compared to propofol-infusion anesthesia.

Key words: Hemodynamics, Recovery characteristics, Sevoflurane, Propofol, Modified Radical Mastectomy

INTRODUCTION

Breast cancer accounts for 23% of all newly occurring cancers in women worldwide and represents 13.7% of all

cancer deaths. The standard conservative surgical treatment for breast cancer is modified radical mastectomy.¹ The need for maintenance of hemodynamic parameters and rapid emergence as well, represent a dynamic clinical challenge for anesthesiologists.²⁻⁴ Various anesthetic agents and a number of alternative anesthetic techniques have been tried with varying results.⁵⁻⁷ The use of intravenous anesthesia with propofol is in widespread clinical practice due to its rapidity and quality of awakening.⁸⁻¹⁰ Sevoflurane is a new inhaled anesthetic that also permits rapid emergence due to its low blood solubility. It has been successfully used as an alternative to propofol for various day care procedures.^{11,12}

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With this background, the present study was conducted to compare the effects of sevoflurane anesthesia with propofol intravenous anesthesia for maintenance of intraoperative hemodynamics and recovery characteristics in patients undergoing modified radical mastectomy.

Aims and Objectives

To assess and compare the effects of sevoflurane versus propofol-based anesthesia on intraoperative maintenance of hemodynamics and recovery characteristics and to find out and compare any adverse occurrences in patients undergoing modified radical mastectomy.

MATERIALS AND METHODS

After approval from the Institutional Ethical Committee, 100 adult patients of American Society of Anesthesiologists (ASA) Grade I or II, undergoing modified radical mastectomy were randomly allocated into two groups (50 each at alpha error 0.05 and power 80%) - Group A (sevoflurane group) and Group B (propofol group) using chit in box method. Patients included in study belonged to age group 40-60 years, weight between 45 and 65 kg and ASA Grade I or II. Patients with major organ dysfunction, ASA Grade III-V, and with anticipated difficult airway were excluded.

All the patients were premedicated with intravenous (IV) glycopyrrolate, midazolam, and fentanyl (2 ug/kg) and induced with injection propofol 1.5-2.5 mg/kg, followed by injection succinylcholine (2 mg/kg) IV. Intubation was done with an endotracheal tube of appropriate size after direct laryngoscopy. Group A was maintained with 1-4% sevoflurane with 60% N₂O in oxygen, and Group B was maintained with injection propofol infusion 50-150 ug/kg/min IV via infusion pump with 60% N₂O in oxygen to maintain bispectral index (BIS) value of 40-60 and muscle relaxation was maintained with injection atracurium. Heart rate (HR), BP, mean arterial pressure (MAP), SpO₂, ETCO₂, and BIS to be recorded. All inhalations and infusions to be stopped at the end of surgery.

Reversal was done with injection neostigmine and injection glycopyrrolate. HR, systolic blood pressure (SBP), diastolic blood pressure (DBP), MAP, SpO₂, ETCO₂, and BIS were recorded preinduction, just after induction, just after intubation, for every 5 min after intubation till 15 min and then at 15 min interval till end of surgery, at end of surgery (till last suture), and just after extubation. Shifting vitals were recorded. Duration of surgery (from skin incision to completion of surgery), emergence time (after stoppage of sevoflurane inhalation and propofol infusion

to reach BIS value of 80), extubation time (end of surgery to removal of endotracheal tube), and recovery time (end of surgery till Aldrete score of 9 is achieved) were noted. Any adverse event intraoperative and post-operative and patient's satisfaction about the quality of anesthesia (any recall of events during surgery, any unpleasant memory, or discomfort) was also noted. The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA, version 19.0 for Windows). Parametric data were analyzed using paired and un-paired *t*-tests. Qualitative or categorical variables were compared using Chi-square test or Fisher's exact test. All statistical tests were two-sided and were performed at a significance level of $\alpha = 0.05$.

RESULTS

There was even distribution of age, weight, ASA grade, and duration of surgery in both the groups with $P > 0.05$ as shown in Table 1. BIS value was kept between 40 and 60 in both the groups by altering inspired concentrations of sevoflurane or infusion rate of propofol. BIS values were also comparable in both the groups at all the time points ($P > 0.05$) as shown in Figure 1. Thus, randomization was done adequately, and the desired study and control populations were achieved.

Baseline HR was comparable in both the groups as shown in Figure 2. HR changes were insignificant between the two groups at just after induction and just after intubation. HR was significantly low in Group B at 5 min ($P = 0.0137$), at 10 min ($P = 0.0019$), and from 15 to 90 min ($P = 0.0000$) compared to Group A. At the end of surgery, there was insignificant difference in HR between the two groups

Table 1: Distribution of age, weight, and duration of surgery among the two groups

Study variables	Mean±SD		P value
	Group A (50)	Group B (50)	
Age (in years)	49±7.5	50±7.5	0.4991
Weight (in kg)	58.2±6.5	56.9±5.6	0.2985
Duration of surgery (min)	117.8±8.3	118.5±8.7	0.6986

SD: Standard deviation

Table 2: Emergence time, extubation time, and recovery time compared between the two groups

Time (min)	Mean±SD		P value
	Group A (50)	Group B (50)	
Emergence time	10.3±2.2	18.7±4.2	0.0000
Extubation time	2.9±1.1	12.9±3	0.0000
Recovery time	5±1.5	18.1±4.9	0.0000

SD: Standard deviation

($P = 0.4665$). Just after extubation, HR was significantly high in Group B ($P = 0.0323$). Shifting HR was comparable between the two groups.

Baseline SBP was comparable in both the groups as shown in Figure 3. There was insignificant change at just after induction, intubation, at 5 min and 10 min in both the groups ($P = 0.6489, 0.4512, 0.1294$, respectively). There was significant rise in SBP in Group B at 15 min ($P = 0.0007$) then at 45, 60, 90 min, and at end of surgery ($P = 0.0003$,

$0.0007, 0.0015, 0.0002, 0.0000$). Just after extubation, both groups showed a significant rise, more with Group B compared to Group A ($P = 0.0000$). Shifting SBP was comparable in both the groups ($P = 0.4270$).

Baseline values of DBP and at just after induction, just after intubation, and at 5 min were comparable in both the groups as shown in Figure 4 ($P = 0.1452, 0.9163, 0.3937$, respectively). There was a significant rise in Group B compared to Group A and from baseline at all time points except at 30 and 75 min. Shifting DBP was comparable in both the groups ($P = 0.9628$).

Baseline MAP, at just after induction, just after intubation, and at 5 min were comparable among the two groups as shown in Figure 5, followed by a significant rise at all the time points in Group B compared to Group A except at 30 and 75 min. MAP at the time of shifting showed insignificant difference among the two groups ($P = 0.7255$).

Group A had a shorter emergence time, extubation time, and recovery time compared to Group B with a statistically significant $P = 0.0000$ as shown in Table 2.

Group A had no adverse event intraoperatively or post-operatively. In Group B, 12 patients suffered from shivering

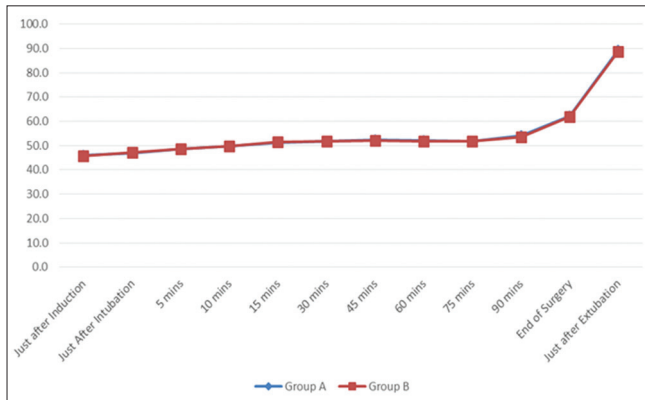


Figure 1: Trend of systolic bispectral index

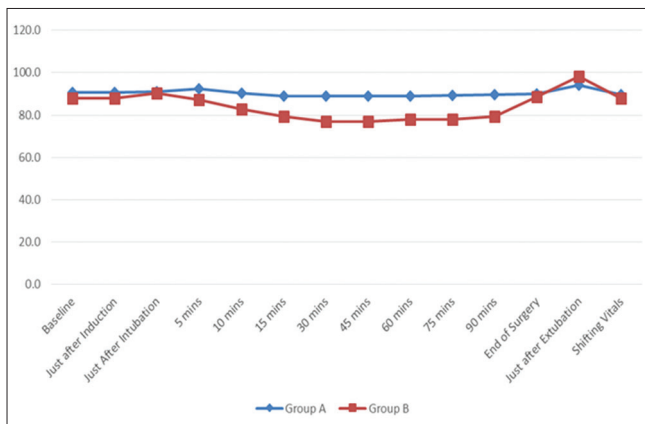


Figure 2: Trend of heart rate

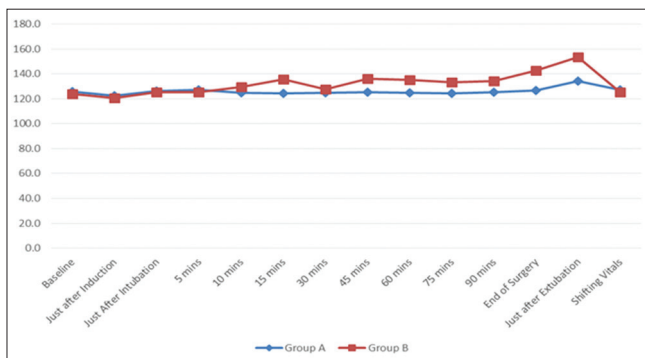


Figure 3: Trend of systolic blood pressure

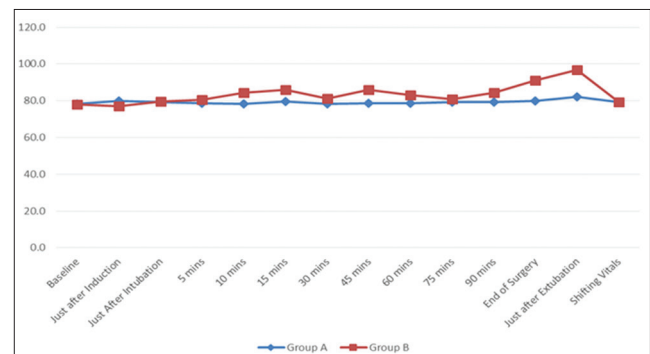


Figure 4: Trend of diastolic blood pressure

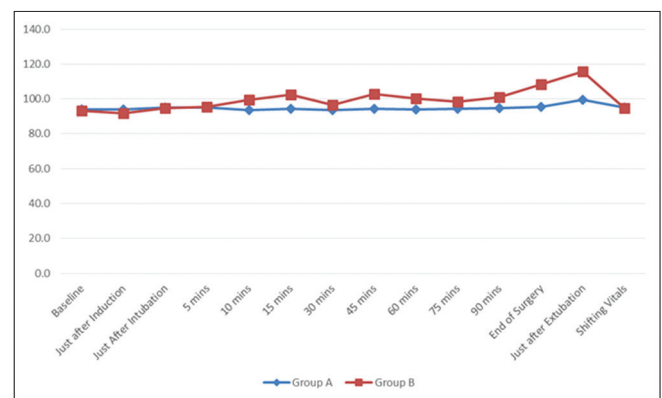


Figure 5: Trend of mean arterial pressure

postoperatively. None of the patient reported of any recall of events and were satisfied with the quality of anesthesia.

DISCUSSION

The present study investigated the hemodynamic responses and recovery profile of inhalational anesthesia with sevoflurane and intravenous anesthesia with propofol in patients undergoing modified radical mastectomy.

The doses of sevoflurane and propofol infusion were titrated according to the BIS monitoring for keeping an adequate depth of anesthesia. Comparison between the two groups revealed that baseline HR, SBP, DBP, and MAP differences were statistically insignificant among the two groups with $P > 0.05$ equating the two groups to compare these parameters at other time points.

HR was more stable in Group A, whereas in Group B, HR varied from baseline values and was significantly low below baseline values at most time points except for a significant rise just after extubation.

SBP was more stable and was comparable to baseline values in Group A at all the time points except for a significant fall just after induction and significant rise just after extubation as shown in Figure 3, whereas in Group B, SBP varies from baseline values with a significant fall just after induction to return to baseline values followed by a significant rise at most time points.

DBP was also more stable in group A and was comparable to baseline values at all the time points except for a significant rise just after extubation as shown in Figure 4, whereas in group B, DBP varied throughout the surgery to maintain a BIS value of 40-60 and was significantly high ($P > 0.05$) at various time points.

MAP was also more stable in Group A, and the difference in MAP throughout the procedure was insignificant except for a significant rise just after extubation as shown in Figure 5. In group B, MAP varied throughout surgery and was significantly high above the baseline at 10 min, 15 min, 45, 60, and 90 min, at the end of surgery and just after extubation.

Our results suggest that sevoflurane provided better intraoperative hemodynamic stability than propofol, and it was similar to the results found by Bharti *et al.*,² who concluded that sevoflurane shows an advantage over propofol in respect of intraoperative cardiovascular stability without increasing recovery time.

Our emergence time, extubation time, and recovery time were more rapid in the sevoflurane group compared to propofol group with a statistically significant $P = 0.000$. Our results are similar as found by Liao *et al.*,¹³ who found more stable hemodynamics and faster recovery with sevoflurane volatile induction and maintenance compared with propofol-remifentanyl TIVA in pediatric patients. Jellish *et al.*¹⁴ also found emergence times with sevoflurane significantly shorter than propofol.

Shivering was reported in 12 patients in propofol group in the post-operative period and was controlled with intravenous tramadol. Vasodilatory effects of propofol may be the cause for this shivering, but it needs further studies to rule out post-operative shivering effects of propofol. None of the patients complained of recall of events postoperatively and were satisfied with the quality of anesthesia.

CONCLUSION

Inhalational anesthesia with sevoflurane provides better hemodynamic stability and early recovery compared to intravenous anesthesia with propofol infusion. Sevoflurane provides a suitable alternative to propofol for anesthesia.

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Study to Establish the Clinical Correlation between Chemical Constituents of Gallstones and Serum Biochemical Parameters

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Abstract

Introduction: Gallstones are solid crystalline precipitates in the biliary tract usually formed in the gall bladder. Gallstones may occur as one large stone or hundreds of tiny stones almost in any combination. Cholesterol and calcium bilirubinate are the two main substances involved in gallstone formation.

Materials & Methods: This study is a prospective cohort study which included 100 consecutive patients over a period of 18-month (October 2013 to August 2015) with imaging studies suggestive of cholelithiasis. A detailed history was recorded from the patients as per the prescribed pro forma and through clinical examination was performed. The recorded data included demographics and details such as onset, duration, location, and progression of abdominal pain, associated symptoms of patient and relevant clinical findings.

Results: In this study it was found that 76% had cholesterol stones, 19% had mixed stones and 5% had pigment stones which suggests that majority of the patients had cholesterol stones. Gallstones represent a major problem in many countries.

Conclusion: Incidence of gallstones is most often correlated with dietary factors and gallstones were found to be more common in patients having a mixed diet as compared to strict vegetarians which might be correlated to increased cholesterol content of the food. A significant correlation was also found between serum bilirubin levels and gallstone formation

Key words: Gallstone, Cholesterol, Bilirubin

INTRODUCTION

The gallbladder is a pear-shaped digestive storage organ that is situated under the liver on the upper right side of the human abdomen. Its job is to store and slowly release bile into the digestive system for the digestion of fats. Bile is excreted from liver and gallbladder in the stomach for digestion. After digestion, if the gallbladder is not emptied

out completely, the bile that remains in the gallbladder can become too concentrated with cholesterol and gallstones are created. Gallstones are one of the most common problems associated with the gallbladder, affecting millions of people throughout the world.¹

The gallstones are solid crystalline precipitates in the biliary tract usually formed in the gallbladder. Gallstones may occur as one large stone or hundreds of tiny stones almost in any combination. Cholesterol and calcium bilirubinate are the two main substances involved in gallstone formation.² Gallstones derived from bile consist of mixture of cholesterol, bilirubin with, or without calcium. Based on their chemical composition, gallstones found in the gallbladder are classified as cholesterol, pigmented, or mixed stones. Gallstones can be mostly white, yellow,

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brown, black, and green colored. Approximately 80% of the gallstones are cholesterol gallstones, which chiefly consist of cholesterol plus bile salts.³

Cholesterol stones are usually yellow but are sometimes white in color. These are divided into two subtypes as pure (90-100% cholesterol) or mixed (50-90% cholesterol). Cholesterol gallstones develop when bile contains too much cholesterol or not enough bile salts. Pure stones often are solitary, whitish, and larger than 2.5 cm in diameter. Mixed stones usually are smaller, multiple in number, and occur in various shapes and colors. The remaining 20% are usually referred to as pigment gallstone, which mainly consists of bilirubin (the pigment) and calcium salts such as calcium carbonate. These occur in two subtypes brown and black. Brownstones are usually made up of calcium bilirubinate. Black stones typically form in the gallbladder result when excess bilirubin enters the bile and polymerizes into calcium bilirubinate. Bilirubin stones are formed from cholesterol and bilirubin, which are mainly seen in people who have hereditary blood disorders such as thalassemia, sickle cell anemia, biliary tract infections, and cirrhosis.⁴ Composite (mixed) stones also occur in the gallbladder, i.e., those consisting of a mixture of cholesterol, bilirubin, and calcium. Diets high in cholesterol and fat, increase the chance of developing stones. Gallstones have a high prevalence among elderly adults.

Aims and Objectives

Aim

To establish the clinical correlation between chemical constituents of gallstone and serum biochemical parameters.

Primary objective

To analyze all gallstones removed after cholecystectomy to detect the presence of cholesterol, pigment, calcium, and phosphate and their relative quantitative and qualitative analysis.

Secondary objective

- To estimate serum cholesterol and serum iron in the patients
- Attempt to establish a correlation with gallstones and decrease serum iron levels
- Attempt to correlate cholesterol gallstones formation with dietary factors, and diabetes mellitus
- To correlate increase serum bilirubin levels with gallstones.

MATERIALS AND METHODS

This study was conducted by enrolling the patients admitted to the ward of K. J. Somaiya Hospital and Research Centre, Mumbai, with imaging studies suggestive of cholelithiasis.

Methodology

This study is a prospective cohort study which included 100 consecutive patients over a period of 18-month (October 2013 to August 2015) with imaging studies suggestive of cholelithiasis. A detailed history was recorded from the patients as per the prescribed pro forma and through clinical examination was performed. The recorded data included demographics and details such as onset, duration, location, and progression of abdominal pain, associated symptoms of patient and relevant clinical findings. Basic investigations included complete hemogram, liver function test, lipid profile, serum iron, serum iron binding capacity, serum creatinine, random blood sugar levels, urine routine microscopy, and electrocardiogram. Imaging studies included plain abdominal radiographs and ultrasound studies.

Patients were subjected to cholecystectomy after complete workup and anesthetic fitness. Gallbladder was sent for histopathological examination, and physico-chemical analysis of gallstones was done. The gallstone surgically removed was crushed with mortar and pestle and then analyzed for cholesterol, calcium, phosphate, and bilirubin (pigment).

Statistical Analysis

This was performed as follows.

Data entry

All patients' data were entered using Microsoft Excel as per the study pro forma which is mentioned under a separate heading below. This included all details of all the blood investigations and stone analysis.

Data tabulation

The data were tabulated, charted, and graphical representation were done using bar diagrams.

Data analysis

Data were analyzed using SPSS (Statistical Package in Social Sciences) version 16 to present frequency and percentage distribution. The following tests were used, and results interpreted in the overall context of the aim of the study.

Analysis of variance (ANOVA)

One-way ANOVA is the parametric test of significance used to compare mean of quantitative data across three or more groups if the data is following normal distribution. It calculates the F-statistics and derives *P* value. The significance of association of test variable (quantitative) with grouping variable (qualitative) can be commented using ANOVA.

Chi-square test

A non-parametric test of significance used for qualitative data having frequency distribution. The Chi-square value is calculated and using the standard table value at calculated

degree of freedom, *P* value is derived. The data should be mutually exclusive and the percentage of cells with expected count <5 should not be more than 20%.

Fischer's exact test

A non-parametric test of significance used for qualitative data having frequency distribution and applied only to, 2 × 2 contingency table when the percentage of cells with expected count <5 is more than 20%.

Inclusion Criterion

- Pain in right upper quadrant of abdomen
- Basic investigations within normal limits
- Imaging studies revealing cholelithiasis.

Exclusion Criterion

- Patient's undergone cholecystectomy
- Pregnant women
- Patients with coagulation defects
- Patients with critical illness or sepsis
- Medically unfit for surgery
- Patients not subjected to imaging studies.

RESULTS

Gallstones

The most common type of gallstone in our study was found to be cholesterol stone followed by mixed stone and pigment stone (Table 1).

Table 1: Frequency of gallstones

Gallstone	Number of patient (%)
Cholesterol stone	76 (76)
Mixed stone	19 (19)
Pigment stone	5 (5)
Total	100 (100)

Table 2: Age-wise distribution of gallstones

Age groups (years)	Number of patients (%)
10-20	4 (4)
21-30	14 (14)
31-40	31 (31)
41-50	24 (24)
51-60	16 (16)
61-70	10 (10)
71-80	1 (1)
Total	100 (100)

Table 3: Sex distribution of gallstone patients

Sex	Number of patients (%)
Male	15 (15)
Female	85 (85)
Total	100 (100)

Age Distribution

Patient with the lowest age was of 13 years and oldest was of 72 years.

Mean age of presentation in years was $42-98 \pm 13.186$ years.

The peak incidence of gallstone formation in this study was seen in 31-40 years age group (Table 2).

Sex Distribution

The incidence of pain in abdomen in males was 15% and in females 85% (Table 3).

Sex and Gallstone

In our study of the 15 (15%) males, 10 (66.7%) patients had cholesterol stones and 5 (33.3%) patients mixed stones.

Of the 85 (85%) females, 66 (77.6%) had cholesterol stones, 14 (16.5%) had mixed stones, and 5 (5.9%) had pigment stones (Table 4).

Food Habits

Out of the 100 gallstone patients, 35 were pure vegetarians and 65 had a mixed diet, i.e., vegetarian and non-vegetarian (Table 5).

Food Habits and Stone

Among 35 vegetarians, 30 had cholesterol stones and 5 had mixed stones.

Among 65 mixed diet patients, 46 had cholesterol stones, 14 had mixed stones and 5 had pigment stones.

Table 4: Sex and gallstone

Sex	Gallstone			Total (%)
	Cholesterol stone (%)	Mixed stone (%)	Pigment stone (%)	
Male	10 (66.7)	5 (33.3)	0	15 (100)
Female	66 (77.6)	14 (16.5)	5 (5.9)	85 (100)
	76 (76)	19 (19)	5 (5)	100 (100)

Table 5: Food habits of gallstone patients

Food habits	Number of patients (%)
Veg	35 (35)
Veg+non-veg	65 (65)
	100 (100)

Table 6: Food habits and stone

Food habits	Gallstone			Total (%)
	Cholesterol stone (%)	Mixed stone (%)	Pigment stone (%)	
Veg	30 (85.7)	5 (14.3)	0 (0)	35 (100)
Veg+non-veg	46 (70.8)	14 (21.5)	5 (7.7)	65 (100)
	76 (76)	19 (19)	5 (5)	100 (100)

These findings were nearly significant ($P = 0.052$) (Table 6).

Cholesterol Status

About 86 patients had increased cholesterol level, whereas 14 patients had a normal level. None of our patients had decreased cholesterol (Table 7).

Cholesterol Status and Gallstones

The mean cholesterol level was highest among mixed gallstone patients followed by cholesterol gallstone then pigment gallstone patients. This difference was found to be significant ($P = 0.04$) (Table 8).

Serum Iron Status

About 93 patients had decreased serum iron, whereas only 7 had normal serum iron. None of our patients had increased serum iron levels (Table 9).

Serum Iron Status and Gallstone

The mean serum iron was found to be highest in mixed gallstones followed by cholesterol stones followed by pigment stone. However, this difference was found to be insignificant ($P = 0.96$) (Table 10).

It was seen that patients having increased serum cholesterol had decreased serum iron though this finding was not

statistically significant, the mean cholesterol level among different gallstone patients was statistically significant ($P = 0.04$) (Table 11).

Cholesterol Status and Diabetes Mellitus

Among the 14 patients who had normal cholesterol, only 1 patient was diabetic, whereas 13 were non-diabetic.

Among the 86 patients who had increased cholesterol, 8 patients were diabetic, whereas 78 were non-diabetic. However, this association was found to be insignificant ($P = 0.632$) (Table 12).

Serum Bilirubin and Gallstones

The mean serum bilirubin was found to highest in pigment gallstone patients followed by mixed gallstone patients followed by cholesterol gallstone patients. The

Table 7: Cholesterol status

Cholesterol status	Number of patients (%)
Increased	86 (86)
Normal	14 (14)
	100 (100)

Table 8: Cholesterol status and gallstones

Gallstone	Number of patients	Serum cholesterol (mean±SD)
Mixed stone	15	255.11±43.721
Cholesterol stone	76	254.99±53.879
Pigment stone	5	192.00±73.736

SD: Standard deviation

Table 9: Serum iron status

Serum iron	Number of patients (%)
Decreased	93 (93)
Normal	7 (7)

Table 10: Serum iron status and gallstone

Gallstone	Number of patients	Serum iron (mean±SD)
Mixed stone	19	54.42±18.15
Cholesterol stone	76	53.42±16.56
Pigment stone	5	52.40±12.56

SD: Standard deviation

Tables 11: Correlation

Correlation of	Pearson coefficient (R)	R ²	Significance (P value)
Serum iron with cholesterol	-0.001	1.876	0.989
Serum iron and cholesterol with cholesterol stones	-0.122	0.015	0.295
Serum iron and cholesterol with mixed stones	0.355	0.126	0.136
Serum iron and cholesterol with pigment stones	0.697	0.485	0.191
Hemoglobin with cholesterol	0.148	0.022	0.142
Hemoglobin and cholesterol with cholesterol stones	0.165	0.027	0.155
Hemoglobin and cholesterol with mixed stones	0.072	0.005	0.770
Hemoglobin and cholesterol with cholesterol stones	0.622	0.387	0.263

Table 12: Cholesterol status and diabetes mellitus

Cholesterol status	Diabetes mellitus	
	Present	Absent
Normal	1	13
Increased	8	78

Table 13: Serum bilirubin and gallstones

Gallstone	Number of patients	Serum bilirubin (mean±SD)
Pigment stone	5	1.84±0.114
Mixed stone	19	1.39±0.66
Cholesterol stone	76	0.81±0.95

SD: Standard deviation

mean bilirubin level was found to be significant ($P < 0.05$) (Table 13).

DISCUSSION

Gallstones represent a major problem in many countries. The incidence of gallstones is most often correlated with socio-economic conditions and dietary factors.

The treatment of gallstone diseases as suggested by Shi *et al.*,⁵ Ertan⁶ and many others run the gamut from bile salts dissolution to fragmentation with laser, pulverization with extracorporeal shock wave lithotripsy, endoscopic extraction, and classical surgery, whereas non-invasive medical therapy is appealing, bile acid therapy is only effective in some cholesterol gallstones.

Our study included a total of 100 gallstone patients all of which underwent cholecystectomy (laparoscopic or open). The gallstones thus obtained were subjected to chemical analysis for the presence of cholesterol, bilirubin, calcium, and phosphate. Conventionally, the stones were classified into 3 categories, namely, cholesterol stones, mixed stones, and pigment stones.

It was found out that of the 100 patients we studied, 76% had cholesterol stones, 19% had mixed stones, and 5% had pigment stones, which suggests majority of our patients had cholesterol stones which are in accordance with the studies carried out by Taher⁷ (cholesterol stones 49%, mixed stones 25%, and pigment stones 18%), Tassaduqe *et al.*⁸ and Shareef *et al.*⁹ (cholesterol stones 54%, mixed stones 40%, and pigment stones 6%), Jarrar and Al-Rowaili.¹⁰ (cholesterol stones 54%, mixed stones 43%, and pigment stones 3%), and Channa *et al.*¹¹ (cholesterol stones 68%).

The youngest patient in our study was 13 years and the eldest was 72 years. Furthermore, studies reported by Channa *et al.*,¹¹ Saqib *et al.*,¹² and Ahmed *et al.*,¹³ the peak age of occurrences were 45-59 years for males and 30-44 years for females, 30-50 years and 41-50 years, respectively. Our study also revealed that gallstones are uncommon in infants and children which was in accordance with Shaffer.¹⁴

Our study concluded that gallstones are more prevalent in females as compared to males with ratio of 5.6:1. This finding is consistent with the results reported by Central Department of Statistics in Saudi Arabia.

While Chen *et al.*¹⁵ concluded that age and fatty liver in both sexes were found to be risk factors for gallstone disease in the study population. Serum cholesterol was found to

be increased in 86 patients. In our study, the mean serum cholesterol was found to be highest in patients with mixed gallstones followed by cholesterol gallstones followed by pigment gallstone patients which was found to significant ($P = 0.04$).

CONCLUSIONS

- The most common type of gallstone was found to be cholesterol type of gallstone followed by mixed and pigment gallstones
- Serum cholesterol levels were found to be raised in the majority of the patients which might be a predisposing factor for cardiovascular diseases, etc. Similarly, serum iron was found to be low in majority of the patients indicating iron deficiency as a cause of gallstone formation
- Gallstones were more common in patients having mixed diet as compared to strict vegetarians which might be correlated to increased cholesterol content of the food. As diabetic patients have increased cholesterol, they were found to be more prone for gallstone formation
- A significant correlation was found to be between serum bilirubin levels and gallstones formation indicating that increased bilirubin may predispose to gallstone formation.

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Bacterial Etiology and their Antibigram in Aerobic Vaginitis Patients at Tertiary Care Hospital, Kota, Rajasthan

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Abstract

Background: Aerobic vaginitis (AV) is a recently identified type of vaginitis that is diagnosed according to microscopic criteria. The clinical characteristics of AV include severely depressed levels of lactobacilli, increased levels of aerobic bacteria and vaginal inflammation. Hence, the present study aims at analyzing the prevalence of AV in females in the reproductive age group (15-45 years) with special reference to pregnancy, pathogens involved and their antibiogram.

Materials and Methods: Over 1-year period, high vaginal swabs were collected from 200 women with clinical suspicion of vaginitis. They were then subjected to Gram-staining, wet mount, and culture. The AV score was determined, and the organisms were then identified and antibiotic sensitivity test of isolates was performed as per Clinical and Laboratory Standards Institute guidelines.

Results: The prevalence of AV in this study was 26% (52/200), and the most common age group affected was between 26 and 30 years. Out of the 52 positive samples, 48 samples yielded monobacterial growth and 4 samples polybacterial growth. The most common organism isolated was *Staphylococcus aureus* followed by *Escherichia coli*, *Enterococcus* spp., and β -hemolytic streptococci. Antibiotics such as β -lactams/ β -lactamase inhibitor combinations, vancomycin, linezolid, and moxifloxacin were found to be more effective against all Gram-positive isolates, whereas the Gram-negative isolates were more sensitive toward β -lactams/ β -lactamase inhibitor combination, meropenem, and moxifloxacin.

Conclusions: The prevalence of aerobic bacterial vaginitis patient with gynecological symptoms is investigated thoroughly. Culture with an antimicrobial sensitivity of causative organism must invariably be done to reduce pregnancy complications such as ascending chorioamnionitis, preterm rupture of the membranes, and preterm delivery.

Key words: Aerobic vaginitis, Bacterial vaginosis, Lactobacillus, *Staphylococcus aureus*, *Escherichia coli*

INTRODUCTION

Inflammation is vaginal mucosa, called vaginitis, is a common clinical syndrome accounting for approximately 10 million office visits each year. Women who present with vaginal symptoms often complain of an abnormal

discharge and additional symptoms such as an offensive odor or itching.¹

A complex and intricate balance of microorganisms maintains the normal vaginal flora. It is mainly dominated by members of the genus *Lactobacillus*, which maintains the generally acidic vaginal pH.²

Because of the poor recognition of AV, this condition is often misdiagnosed as bacterial vaginosis (BV), which may lead to treatment failures and severe complications, such as pelvic inflammatory disease, infertility, miscarriage, chorioamnionitis, premature rupture of membranes, and preterm delivery.³⁻⁶ Ascending infection during gestation

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may also result in maternal complications such as sepsis, septic arthritis, and maternal respiratory distress and even menstrual toxic shock syndrome.⁷

MATERIALS AND METHODS

Source of Data

Vaginal swab specimens were obtained from females in the reproductive age group of 15-45 years with symptomatic vaginal discharge, attending the Gynaecology Department (Outpatients and inpatients) of Jay kay lon maternal and child hospital and New Medical College Hospital, Kota.

Study Design

It was a prospective type of study, conducted on samples collected during a period of 1-year between October 2014 and September 2015.

Inclusion Criteria

High vaginal swab (HVS) from females in the reproductive age group of 15-45 years, with symptomatic vaginal discharge and pregnant females, irrespective of their gestational age, were included in the study.

Exclusion Criteria

Patients with a diagnosis of BV, candidiasis, trichomoniasis, *Neisseria gonorrhoea*, and *Chlamydia trachomatis* cervicitis were excluded from the analysis. Patients treated with oral or parenteral or with local application of antibiotics for at least 1 month before attendance to the hospital were omitted from the study.

Sample Collection Transport and Processing

An unmoistened sterile speculum was inserted before examination of vagina. Three HVSs were collected in sterile saline solution to avoid dryness of samples. The first swab was used for Gram's-staining.⁸ Second swab was used for the preparation of wet mount and KOH mount. The AV score was calculated by microscopic examination under $\times 40$ magnification, according to a modified Donder's score.⁹ An AV score of <3 was taken as "no signs of AV," 3-4 as "light AV," 5-6 as "moderate AV," and any score >6 as "severe AV." AV was diagnosed if smears were deficient in lactobacilli, positive for cocci or coarse bacilli, positive for parabasal epithelial cells, and positive for vaginal leukocytes.⁹ gram staining of normal vaginal flora shown in Figure 3.

The third swab was inoculated onto MacConkey's agar, blood agar, and chocolate agar.¹⁰ The aerobically incubated bacterial growth was identified by standard biochemical reactions.¹¹ The antibiotic sensitivity of aerobic bacterial isolates was performed by standardized Kirby-Bauer disc

diffusion technique as per the Clinical and Laboratory Standards Institute guidelines.¹² The antimicrobial discs were obtained from Hi Media Laboratories Private Limited, Mumbai.

Statistical Analysis

The results were expressed as percentages for the analysis of various data. Microsoft Excel was used for the interpretation of these results.

RESULTS

A total of 200 HVSs collected from patients with suspicion of vaginitis were sent from the obstetrics and gynecology department to the laboratory for culture, out of which 52 samples yielded growth under aerobic conditions. Hence, the prevalence of AV in this study was 26%.

The study group included women in the reproductive age group, i.e., between 15 and 45 years. The maximum number of AV cases fell in the age group of 26-30 years (37.5%), followed by 31-35 years (31.57%) depicted in Table 1.

The prevalence of AV cases was higher among non-pregnant (33.57%) compared to pregnant cases (8.33%) depicted in Table 2.

Table 1: Age wise distribution of AV cases

Age group (years)	Number of samples studied (n=200)	Number of culture positive samples (n=52) (%)
15-20	12	1 (8.33)
21-25	37	10 (27.02)
26-30	64	24 (37.5)
31-35	38	12 (31.57)
36-40	17	3 (17.64)
41-45	32	2 (6.25)

AV: Aerobic vaginitis

Table 2: Distribution of AV cases among pregnant and non-pregnant women

Category	Total number of samples collected (n=200)	Number of culture positive samples (n=52) (%)
Pregnant	60	5 (8.33)
Non-pregnant	140	47 (33.57)

AV: Aerobic vaginitis

Table 3: Grading of AV

Grading of AV	Number of positive samples (n=52) (%)
Mild AV	42 (80.76)
Moderate AV	8 (15.38)
Severe AV	2 (3.84)

AV: Aerobic vaginitis

In this study, 80.76% of women had mild AV, 15.38% with moderate AV, and only 3.84% of women with severe AV were detected (Table 3).

In the present study of 52 culture positive samples, 92.31% yielded single organism on culture and 7.69% samples yielded dual organisms (multiple) (Table 4).

The most common etiological agent of AV in this study was *Staphylococcus aureus* (41.07%), followed by *Escherichia coli* (21.43%), *Enterococcus* spp. (12.5%), and β -hemolytic streptococci (8.93%) (Figure 1).

There were 4 samples of AV with multibacterial growth, each with two bacteria. 50% samples had a combination of *S. aureus* + *E. coli*, 25% samples had a combination of CONS + *Enterobacter cloaca*, and another 25% was with *Enterococcus* spp. + *E. coli*, shown in Figure 2.

The Gram-positive organisms were maximum sensitive toward β -lactams/ β -lactamase inhibitor combinations, vancomycin, and linezolid (Table 5).

The Gram-negative isolates were least sensitive to ampicillin but showed moderate sensitivity toward third generation cephalosporin, aminoglycosides, and levofloxacin but were highly sensitive to amoxy-clav and meropenem and moxifloxacin. The most effective antibiotics against *Pseudomonas aeruginosa* were amoxicillin-clavulanic acid, gentamicin, tobramycin, meropenem, and moxifloxacin (Table 6).

Table 4: Growth pattern of the culture positive samples (n=52)

Growth pattern	Number of culture positive samples (%)
Single organism	48 (92.31)
Multiple organism	4 (7.69)
Total	52 (100)

DISCUSSION

The prevalence of AV in the present study was 26% which correlates with that of Fan *et al.*, in China,¹³ who reported the prevalence rate of 23.74% and Sangeetha *et al.*¹⁴ in Bangalore, India, also reported a culture positivity of 20.8%. Even higher prevalence of AV was observed by Ling C (80%), in 2009, and by Razzak *et al.* (95.45%) in 2011,^{15,21} whereas Donders *et al.*, in 2002 (Belgium¹⁷) reported a lower prevalence rate of AV, i.e., 7.9% and Donders *et al.*, in 2009¹⁸ reported a prevalence of 8.3% among pregnant women.

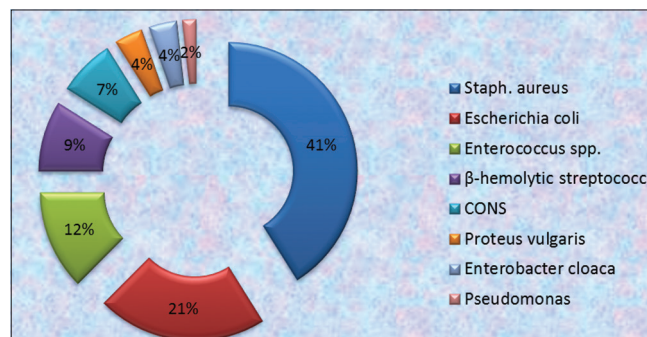


Figure 1: Distribution of organisms isolated from aerobic vaginitis cases

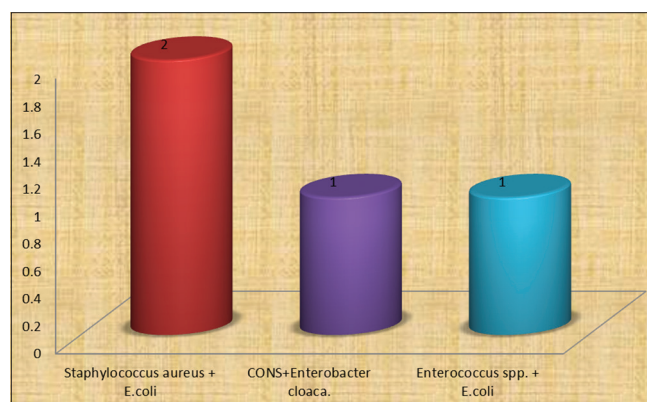


Figure 2: Distribution of mixed isolates in aerobic vaginitis cases

Table 5: Percentage of sensitivity of gram positive isolates to various antibiotics

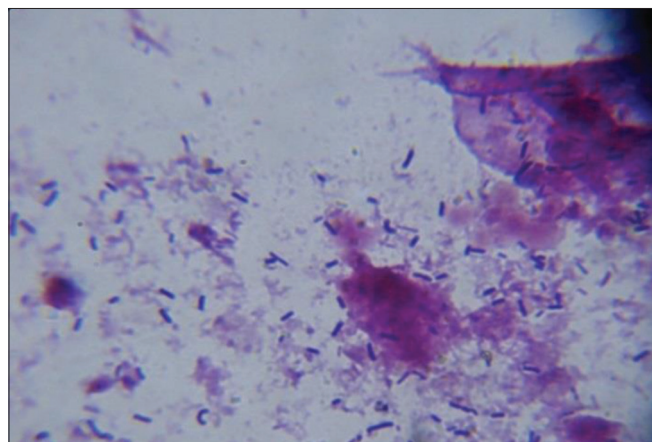
Antimicrobial agent	<i>Staphylococcus aureus</i> (n=23) (%)	<i>Enterococcus</i> spp. (n=7) (%)	β -hemolytic streptococci (n=5) (%)	CONS (n=4) (%)
Penicillin	9 (39.1)	3 (42.8)	5 (100)	2 (50)
Ampicillin	NT	4 (57.1)	5 (100)	NT
Amoxicillin-clavulanic acid	17 (73.9)	NT	5 (100)	3 (75)
Cefoxitin	17 (73.9)	NT	NT	4 (100)
Clindamycin	21 (91.3)	NT	3 (60)	4 (100)
Vancomycin	23 (100)	7 (100)	NT	4 (100)
Linezolid	23 (100)	7 (100)	NT	4 (100)
Doxycycline	20 (86.9)	3 (42.8)	3 (60)	4 (100)
Levofloxacin	21 (91.3)	4 (57.1)	3 (60)	4 (100)
Moxifloxacin	21 (91.3)	5 (71.4)	4 (80)	4 (100)
Gentamicin	17 (73.9)	6 (85.71)	3 (60)	3 (75)

NT: Not tested

Table 6: Percentage of sensitivity of gram negative isolates to various antibiotics

Antimicrobial agent	<i>Escherichia coli</i> (n=12) (%)	<i>Proteus vulgaris</i> (n=2) (%)	<i>Enterobacter cloaca</i> (n=2) (%)	<i>Pseudomonas aeruginosa</i> (n=1) (%)
Ampicillin	4 (33.3)	NT	1 (50)	NT
Amoxicillin-clavulanic acid	9 (75)	NT	2 (100)	1 (100)
Gentamicin	9 (75)	1 (50)	2 (100)	1 (100)
Amikacin	8 (66.6)	2 (100)	2 (100)	0
Levofloxacin	9 (75)	2 (100)	1 (50)	0
Moxifloxacin	10 (83.3)	2 (100)	2 (100)	1 (100)
Cotrimoxazole	8 (66.6)	NT	1 (50)	NT
Ceftriaxone	9 (75)	1 (50)	1 (50)	NT
Cefotaxime	9 (75)	1 (50)	1 (50)	NT
Ceftazidime	NT	2 (100)	NT	0
Aztreonam	6 (50)	1 (50)	1 (50)	0
meropenem	12 (100)	2 (100)	2 (100)	1 (100)
Piperacillin	NT	1 (50)	NT	0
Piperacillin-tazobactam	NT	2 (100)	NT	1 (100)
Tobramycin	NT	NT	NT	1 (100)

NT: Not tested

**Figure 3: Gram's-staining (×1000 magnification): Normal vaginal flora**

In the present study, the highest prevalence of vaginal infections was noted among young sexually active females at the age group of 26-30 years (37.5%) followed by 31-35 years (31.57%) and 21-25 years (27.02%). This was in concordance with studies done by Sangeetha *et al.*, Mumtaz *et al.*, and Khan and Khan.^{2,14,16} The frequency of culture positivity seems to decline progressively with increasing age.

The prevalence of AV among pregnant women in this study was 8.33%. It correlates with the study of Zodzika *et al.*, in 2010,¹⁷ which accounts for a prevalence rate of 10.79%. Donders *et al.*, 2009¹⁸ studied 759 pregnant women among which 8.3% had coccoid AV flora. The low incidence of AV among pregnant women in present study may be due to the fact that pregnancy is a period, in which the vaginal microbiota conditioned by high estrogen levels has a good supply of glycogen and a high percentage of lactobacillary flora which significantly reduces the multiplication of pathogenic organisms, more due to production of defense factors by lactobacilli.¹⁹

The maximum number of cases in this study was diagnosed with mild AV (80.76%). Moderate AV was reported in 15.38% of cases and severe AV in only 3.84% of cases which is in accordance with studies done by Zodzika *et al.* and Sobel *et al.*^{17,20}

About 92.31% of cases yielded single bacterial growth, whereas 7.69% yielded multiple organisms (two bacterial species in culture) which are nearby to study of Sangeetha *et al.* (India)¹⁴ which detected 88.77% single bacterial isolate and 19.23% multibacterial isolates. The present study is, in contrast, to study done by Razzak *et al.*, 2011 (Iraq),²¹ who observed 50 (47.62%) out of 105 cases as a polymicrobial organism.

In the present study, *S. aureus* (41.07%) was the most prevalent organism isolated from AV cases followed by *E. coli* (21.43%) and *Enterococcus* spp. (12.5%). In a study by Mumtaz *et al.* (Pakistan),¹⁶ *S. aureus* (46.07%) was the most prevalent isolated pathogen. Tansarli *et al.*⁴ and Zarbo *et al.*¹⁹ also reported a high prevalence of *S. aureus* which is 41.7% and 27.9%, respectively.

About 8.93% of the vaginal isolates in the present study were β -hemolytic streptococci. Similar rates have been observed by Mumtaz *et al.*¹⁶

The Gram-positive organisms in this study showed more resistance to penicillin and ampicillin. 39.1% of the *S. aureus* isolates were resistant to penicillin. Most of the β -hemolytic streptococci were sensitive to penicillin and is in tallying with Mumtaz *et al.*¹⁶ In most cases of *S. aureus*, resistance to penicillin is attributable to β -lactamase production. Therefore, penicillin in combination with one of the β lactamase inhibitors gives much better results²² as clearly seen from the present study.

The most effective chemotherapeutic agents against Enterobacteriaceae were amoxy-clav, aminoglycosides moxifloxacin and meropenem which is in correlation with study done by Tariq *et al.*²³

Most of the *Pseudomonas* species were found resistant to piperacillin and ceftazidime, whereas 100% of the isolates were sensitive to piperacillin-tazobactam, gentamicin, and meropenem. Similar antibiogram pattern was observed Mumtaz *et al.*¹⁶

CONCLUSIONS

The study concluded that the types of antibiotics used to treat vaginitis must be very selective in order not to kill the beneficial bacteria (*Lactobacilli*) that help in preservation of vaginal health and ecosystem. This study is also helpful in the prevention of neonatal morbidity and mortality using appropriate antibiotics along with their rational use to avoid emergence of drug resistance.

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Retrospective Study to Find Reliability of A-scan Biometry in Tertiary Care Center

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Abstract

Introduction: The refractive power of pseudophakos is final, and the patient must live with any mistake committed or be subjected to replacement of intraocular lens (IOL).

Aim: To study the reliability of A-scan biometry in tertiary institution where measurements were taken by multiple persons.

Materials and Methods: A retrospective series of 110 cases of cataract extraction and in the bag fixation of IOL done from December 2015 to April 2016 in Government Theni Medical College Hospital, Theni, were investigated.

Results: The keratometry, axial length, and IOL powers were measured. The number of patients who had uncorrected visual acuity of 6/9 or better was 20 post-operative refractive errors were listed. All cylindrical errors were due to surgical incisions. Hence, a spherical equivalent is not calculated, and only spherical errors are taken into discussion.

Conclusion: This study has shown that in institution where multiple persons perform biometry chances of post-operative refractive error can be minimized if precise and proper technique is followed and it is possible to have prediction errors below 1.00 D on the average.

Key words: Astigmatism, Intraocular lens, Pseudophakia, Spherical equivalent

INTRODUCTION

The refractive power of pseudophakos is final, and the patient must live with any mistake committed or be subjected to replacement of intraocular lens (IOL).¹ To ensure that our patient will have an optimal correction, the power of the lens to be implanted must be determined precisely and perfectly in every case.

MATERIALS AND METHODS

A retrospective series of 110 cases of cataract extraction and in the bag IOL fixation done in GTMCH, Theni, were

investigated. Cataract extraction done by small incision cataract surgery and phacoemulsification were included in the study.

Keratometry was performed with Bausch and Lomb Keratometer which uses fictitious index of 1.3375.² In the presence of corneal astigmatism, the median value reading was taken as the working figure. The axial length was measured with a biomedix A-scanner using an applanation type 10 MHz transducer.³

Single piece, biconvex, Mod C step vault, PMMA, UV absorbing IOL with optic size 6.5 mm and length 13.5 mm A constant - 118.2. The pseudophakic refraction was predicted according to SRK - II formula.

All refractions were spherical equivalents recorded 4 to 6 weeks after surgery. Only cases with the final visual acuity of 6/9 or better were included because of minimal intended refractive error due to the difference between calculated IOL power and implanted IOL power.

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Inclusion Criteria

All uncomplicated cases of cataract surgery.

Exclusion Criteria

1. Congenital and developmental cataract
2. Cases with post-operative complications
3. Patients for whom IOL was not fully in the bag.

RESULTS

The keratometry, axial length, and IOL powers are shown in Table 1.

The number of patients who had uncorrected visual acuity (UCVA) of 6/9 or better is shown in Tables 2 and 3.

All the cylindrical errors are due to surgical incisions. Hence, spherical equivalence is not calculated, and only spherical errors are taken into discussion (Table 4).

DISCUSSION

The visual results are expressed as the percentage of eyes that achieved UCVA and best corrected visual acuity of 6/9 or better.

Table 1: Parameters

Keratometry	Mean	44.57
	Range	41-47.52
Axial length	Mean	22.52
	Range	20.17-25.2
IOL power	Range	17-27

IOL: Intraocular lens

Table 2: Cylindrical errors

Cylindrical power	Number of patients
<-1.00 D Cylinder	56
1.00--2.00 D cylinder	28
-3.00 D cylinder	6

Table 3: Spherical errors

Spherical error	Number of patients
<-1.00 D	9
1.00--2.00 D	3
-2.00 D	3

Table 4: The variance of outcome of spherical equivalence in percentage

<-1.00D	94.5%
1.00--2.00D	2.5%
2.00--3.00D	3%

The refractive results are given as percentage of patients with biometry prediction errors of <1, 2 and 3 D. 94.5% of patients had post-operative refractive error < -1.00 D of sphere. 97% of patients had post-operative refractive error < -2.00 D. The remaining patients had post-operative spherical equivalent up to -3.00 D. This could be explained by the defective measurements made preoperatively.

IOL power prediction errors can be divided into two as follows:

1. Measurement errors
2. Formula errors.

Formula errors can arise as a result of inadequate mathematical representation of the optics of the pseudophakic eye or as a result of errors in the prediction of surgical effect.⁴

In this study, 97% of patients had post-operative refractive error of < 2.00 D which when compared to other studies using same formula is slightly lower.

Most of the reference studies used partial coherence interferometry for measuring axial length.⁵ Measurements were taken by a trained optometrist. Whereas in our study, it was done by ultrasound biometry and were taken by various persons including trained optometrist, students and ophthalmologists.

The difference in axial length measured between ultrasound biometry and partial coherence interferometry was up to 0.47 m longer which corresponds to around 1.5 D.⁶ Reasons for difference in length are:

1. Pressure exerted by USG probe
2. In partial coherence interferometry, light is reflected at the retinal pigment epithelium, whereas ultrasound is mainly reflected at the internal limiting membrane, this resulting in difference that corresponds to the thickness of the fovea, which is about 130 μ m.

CONCLUSION

With the evolution of small incision techniques that minimize surgically induced astigmatism, IOL power selection becomes a crucial step for the refractive outcome of cataract surgery. This study has shown that in institution where multiple persons perform biometry chances of post-operative refractive error can be minimized if precise and proper technique is followed and it is possible to have prediction errors below 1.00 D on the average.

The chance of post-operative refractive error could be further reduced if SRK T formula is used for IOL power calculation.

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Clinical, Biochemical, and Hematological Pointers toward Dengue Infection in Patients with Acute Undifferentiated Fever

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Abstract

Background: Acute undifferentiated fever (AUF) is fever of < 3 weeks duration with no organ-specific disease features. Dengue infection occurs throughout the year and accounts for about 5% of the cases of AUF. The prompt and appropriate diagnosis will help avoid the use of antibiotics and antimalarials. The tests for carrying out screening for dengue infection are not universally available and are expensive. Hence, the need for appropriate clinical, biochemical, and hematological pointers toward the diagnosis of dengue and its complications.

Materials and Methods: It is a prospective observational study at MIMS, Mandya. The patient's data, platelet count, mean platelet volume (MPV), platelet distribution width (PDW), biochemical parameters, and clinical characteristics were selected using standard pro forma.

Results: Out of 162 patients with an acute differentiated fever, 15 patients had dengue fever. A headache was present in all patients with dengue fever and was statistically significant. Thrombocytopenia, decreased MPV and PDW, was associated with dengue fever and was statistically significant.

Conclusion: The hematological parameters like reduced platelet count, MPV and PDW in patients with AUF significantly points toward possibility of dengue fever.

Key words: Acute undifferentiated fever, Dengue fever, Mean platelet volume, Platelet count, Platelet distribution width

INTRODUCTION

Acute undifferentiated fever (AUF) is fever of <3 weeks duration with no organ-specific disease features. AUF accounts for vast majority of outpatient visits and inpatient admissions in India.¹ The causes for the same are variable and a systematic approach to identify the cause is necessary, for appropriate therapy. Most of the cases of dengue infection occur during the post-monsoon period.² However, dengue infection occurs throughout the year and accounts for about 5% of the cases of AUF.³ The prompt and appropriate diagnosis will help avoid the use

of antibiotics and antimalarials.¹ It also helps in the early recognition of complications and their management. The tests for carrying out screening for dengue infection are not universally available and are expensive. Hence, the need for appropriate clinical, biochemical, and hematological pointers toward the diagnosis of dengue and its complications.

Aims and Objectives

- To identify clinical features, biochemical and hematological parameters in patients with AUF, which are suggestive of dengue infection.
- To identify clinical features, biochemical and hematological parameters which help in assessment of severity of dengue infection.

MATERIALS AND METHODS

The patients presenting with fever of <15 days with no localizing symptoms and signs were included in the study.

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The clinical features of the patient were noted. The routine biochemical (renal function tests and liver function tests) and hematological parameters done as a part of the fever workup was collected. The patients were screened for dengue infection using NS1 antigen and IgM antibodies. The data were collected in specially designed pro forma and analyzed. A platelet counts $<1,50,000$ cells/mm³ mean platelet volume (MPV) <9 fl and platelet distribution width (PDW) <13 were taken as reduced.

Study Site

Mandya Institute of Medical Sciences, Mandya.

Source of Data

Outpatients attending the Medical out-patient department and inpatients admitted in medical wards and MIMS, Mandya.

Study Design

Prospective observational study.

Inclusion Criteria

Patients over the age of 14 years admitted with fever of <15 days duration with no localizing features.

Exclusion Criteria

- Fever of more than 15 days duration
- Age <14 years
- Retroviral positive disease
- Localized causes of fever like abscess, pneumonia, meningitis, etc.

The statistical significance was assessed by measuring *P* value. A *P* < 0.05 was considered statistically significant.

RESULTS

This is an interim report after 4 months a 1 year study. The study screened a total of 162 patients with AUF. A total of 15 patients were diagnosed with dengue infection (11 NS1 positive and 4 IgM reactive).

The presence of headache, thrombocytopenia, decreased MPV and PDW had statistically significant association with dengue fever in patients with AUF. A headache was present in all patients with dengue fever. The presence of myalgia and arthralgia were much common in patients with dengue fever but was not statistically significant.

DISCUSSION

Dengue infection is an acute infection caused by single-stranded RNA virus belonging to genus *Flavivirus*. There are four serotypes of dengue virus. The infection

is transmitted by the bite of *Aedes* mosquitoes. The incubation period ranges from 4 to 10 days. The illness progresses through three phases, febrile phase, critical phase, and recovery phase. Symptomatic dengue infection is grouped by the WHO and divided into three categories.⁴

- Undifferentiated fever
- Dengue fever
- Dengue hemorrhagic fever.

Plasma leakage, hemoconcentration, and abnormalities in homeostasis characterize severe dengue. The mechanisms leading to severe illness are not well defined but the immune response, the genetic background of the individual and the virus characteristics may all contribute to severe dengue. With appropriate initiation of therapy, the case fatality rate is $<1\%$.⁴

The cause of the AUF varies depending on the season and the geographic location. Various studies have reported diagnosis of malaria in 5-50% cases, scrub typhus/*Rickettsia* fevers in 4-49% cases, enteric fever in 7-30% cases, dengue in 4-19% cases, leptospirosis in 3-10% cases, and influenza in 8-12% cases.¹

The API guidelines¹ for the management of AUF recommends screening for malaria in all cases by microscopy or rapid diagnostic tests (RDT). The microscopy has sensitivity and specificity of 99.6% and 100% respectively for diagnosis of malaria.⁵ If negative for malaria, the patient should be screened for dengue fever. NS-1 antigen-based test is the first step for detection for dengue fever. NS-1 antigen positivity appears on the first day of fever, and may last till ninth day. When NS-1

Table 1: Characteristics of dengue and non-dengue acute febrile illness

Characteristic	Dengue fever (%)	Non-dengue acute febrile illness (%)	<i>P</i> value
Gender			
Male	11 (66.7)	118 (80.3)	0.51
Female	4 (33.3)	29 (20.7)	
Clinical features			
Headache	15 (100)	23 (15.7)	0.0001
Myalgia	12 (80)	88 (59.9)	0.1668
Arthralgia	13 (86.7)	92 (62.6)	0.0877
Sore throat	2 (13.3)	63 (42.9)	0.0146
Lymphadenopathy	0 (0)	16 (10.9)	0.3661
Laboratory investigations			
Increased AST	4 (33.3)	33 (22.4)	0.7486
Elevated creatinine	1 (6.7)	13 (8.8)	1.0000
Leukocytosis	8 (53.3)	79 (53.7)	0.5828
Thrombocytopenia	11 (66.7)	17 (11.6)	0.0001
Decreased MPV	13 (86.7)	9 (6.1)	0.0001
Decreased PDW	12 (80)	18 (12.2)	0.0001
Total	15	147	

MPV: Mean platelet volume, PDW: Platelet distribution width

antigen based rapid test is combined with IgM ELISA, the sensitivity of diagnosis of early dengue reaches 93% and the specificity hovers around 83%. RDT for IgM antibody detection against dengue is useful after the 5th day of fever, as the test is negative early in the course of disease.⁶ If NS-1 or IgM based RDT for dengue is positive, patients must receive guideline-based care for dengue.⁵

In a study conducted in Srilanka by Reller *et al.*,⁷ a headache was the most frequent (75.9%) symptom, and lethargy and muscle and joint pain were also reported by >50% of patients with dengue; however, these symptoms were just as frequent in patients without dengue. These findings are similar to our study. Patients with dengue were less likely than those without it to report a cough and sore throat and to have lymphadenopathy, and same was observed in the study.

In a study conducted by Kashikunti *et al.*,⁸ leukocytosis, acute respiratory distress syndrome, aseptic meningitis, mild serum transaminase elevation, and hypoalbuminemia, in AUF were associated with scrub typhus and dengue. In a study conducted on children with AUF between the ages of 6 months with 12 years, young age, rash, and raised alanine transaminase (ALT) were significant independent pointers to dengue.³

Bashir *et al.*⁹ observed that low platelet count, MPV and platelet distribution width PDW may be used as probable indicators for dengue in an endemic area. MPV <9 fl and PDW >13 fl shows considerable sensitivity for the diagnosis of dengue fever. Similar observations were drawn from this study.

CONCLUSION

The hematological parameters like reduced platelet count, MPV and PDW in patients with AUF significantly points toward possibility of dengue fever.

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Comparative Evaluation of Push-out Bond Strength of Novel Smart Seal System with Resilon/Epiphany and Gutta-percha/Ah-plus Obturating System: An *in vitro* Study

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Abstract

Background: The objective of three-dimensional obturation is to completely seal the canal system from any bacterial ingress from the oral cavity and periradicular tissues. The aim of the study to compare the push-out bond strength of the smart seal C-point obturating system with epiphany resilon obturation system and the gold standard gutta-percha/AH plus system.

Materials and Methods: Thirty extracted mandibular first premolars, instrumented until propater F3. All the teeth are divided into three groups of 10 each according to obturating material. Group I - AH plus sealer and F3 master gutta-percha cone (Dentsply Maillefer); Group II - The resilon core material of size 30/.06 and epiphany sealer; Group III - EndoSequence BC sealer and F3 C-point. Each sample was sectioned horizontally into 2 mm thick slices at each of the three-thirds (coronal, middle and apical). Specimens subjected to the universal testing machine at the vertical load at a rate of 1.0 mm/min. The bond strength was recorded in Mpa, by dividing the load in Newton by the area of bonded interface using. The data were analyzed statistically using Statistical Package for Social Sciences version 1.4 and one-way analysis of variance (ANOVA) with Tukey's *post-hoc* test.

Results: The mean push-out test values for each group were as follows in coronal third Group I (1.5±0.27 Mpa), Group II (0.99±0.21 Mpa), and Group III (3.77±0.47 Mpa); in middle third Group I (1.45±0.14 Mpa), Group II (0.96±0.15 Mpa), and Group III (3.43±0.122); in the apical third Group I (1.39±0.01 Mpa), Group II (0.90±0.15 Mpa), and Group III (3.3±0.78 Mpa). ANOVA revealed a statistically significant difference among the groups ($P < 0.05$).

Conclusion: Within the limitations of the study, it can be concluded that C-point/bioceramic sealer showed the highest push-out bond strength followed by gutta-percha/AH plus and epiphany/Resilon.

Key words: Push-out bond strength, Resilon epiphany, Root canal filling, Smart seal system

INTRODUCTION

Successful root canal treatment depends on the thorough debridement of the root canal system, the elimination of pathogenic organisms and finally the complete sealing of the canal space to prevent ingress of bacteria from the oral environment and spread to the periapical tissue.¹

The presence of great anatomic complexity of the root canal system has advocated the evolution of different materials and techniques to achieve the desired fluid tight hermetic seal.²

The physical properties necessary for this function include adaptation and adhesion of the filling material to the root canal wall.¹ Gutta-percha, in combination with sealer, is the most widely used material for endodontic root canal obturation.² A root canal sealer is essential to not only assist in filling irregular spaces but also to enhance the seal during compaction and to penetrate into small, normally inaccessible, areas, i.e., the dentinal tubules. Gutta-percha along with sealer displayed less leakage than those without sealer.³

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Higher bond strength decreases leakage and improves the stability of root canal obturation material.³

Gutta-percha with an epoxy resin-based sealer AH plus has set a gold standard as an obturation system. Despite several advantages exhibited by the system, its hydrophobic nature and its inability to sufficiently reinforce the root canal remain its drawbacks.⁴

Resilon/epiphany (Pentron Clinical Technologies, Wallingford, CT) is the first obturation system to claim the ability to compose a “monoblock” between the canal walls and obturation material.⁵ This product is used in combination with a self-etching primer to create a solid monoblock. Resilon is a thermoplastic synthetic resin material that is based on polymers of polyester and contains a bifunctional methacrylate resin, bioactive glass, and radiopaque fillers. The resin sealer, epiphany root canal sealant, contains bisphenol-A diglycidyl dimethacrylate (Bis-GMA), ethoxylated Bis-GMA, urethane dimethacrylate, hydrophilic difunctional methacrylates, silane-treated barium borosilicate glasses, barium sulfate, silica, calcium hydroxide, bismuth oxychloride with amines, peroxide, photoinitiator, stabilizers, and pigment. The primer is an aqueous solution of an acidic monomer. The system also includes pellets that can be used for backfilling in thermoplasticized techniques.

The most recent advancement in endodontic obturating materials uses a hydrophilic polymer in the root canal, the smart seal C-point system (EndoTechnologies, LLC, Shrewsbury, MA, USA). The C-point system is a point-and-paste root canal filling technique that consists of pre-made, hydrophilic endodontic points and an accompanying bioceramic sealer. These points are designed to expand laterally without expanding axially, by absorbing residual water from the instrumented canal space and that from naturally-occurring intra-radicular moisture. The inner core of C-point is a mix of two proprietary nylon polymers: Trogamid T and Trogamid CX. The polymer coating is a cross-linked copolymer of acrylonitrile and vinylpyrrolidone, which has been polymerized and cross-linked using allyl methacrylate and a thermal initiator. The lateral expansion of C-point is claimed to occur non-uniformly, with the expandability depending on the extent to which the hydrophilic polymer is pre-stressed (i.e., contact with a canal wall will reduce the rate or extent of polymer expansion). This nonisotropic lateral expansion is said to enhance the sealing ability of the root canal filling, thereby reducing the possibility of re-infection, and potentiating the long-term success of root canal treatment.⁶

In the literature, negligible data is available regarding the accentuation on the hydrophilic obturating systems on the push-out bond strength of root canal nature. Therefore, the purpose of this study was to compare the hydrophilic smart

seal C-point obturating systems, with resilon epiphany and the gold standard gutta-percha/AH plus system.

MATERIALS AND METHODS

Thirty extracted sound-matured human mandibular first premolars extracted for orthodontic reasons were selected and stored in 10% formalin until the beginning of the experiment. Teeth were sectioned horizontally below the cemento-enamel junction under water coolant, to obtain a standardized root length of 13 mm. The working length was determined by introducing a 15 K file until it could be seen at the apical foramen, subtracting 1 mm from this length. Thirty teeth were instrumented up to a master apical file size of F3 with protaper rotary files (Dentsply Maillefer) using a 16:1 reduction handpiece with torque and speed-controlled electric motor (X smart; Dentsply Maillefer). The canals were irrigated with 2 ml of 3% sodium hypochlorite (Prime Dental Products, Thane, India) during instrumentation. After preparation, canals were filled with 5 ml of 17% ethylenediaminetetraacetic acid (Anabond Stedman Pharma Research, India) for 1 min to remove the smear layer, and the final flush was performed using 5 ml of distilled water. The samples were then dried with absorbent protaper paper points (Dentsply). Thirty teeth were divided into 3 Groups of 10 samples each.

Obturation and Distribution of Specimens

Group I ($n = 10$) - (AH plus + gutta-percha) AH plus sealer was mixed according to the manufacturer's instructions and placed into the root canals with a lentulo spiral filler and obturation was done with corresponding protaper gutta-percha cones.

Group II ($n = 10$) - (resilon + epiphany SE) epiphany self-etching sealer was then expressed using the automix syringe tip and obturation was done with corresponding 6% resilon points. Once the obturation was completed, the coronal surface was light-cured for 40 s.

Group III ($n = 10$) - (C-point + bioceramic sealer) bioceramic sealer was placed into the root canals using the syringe and capillary tip and obturated by corresponding C-point.

Mesiodistal and buccolingual radiographs were taken to confirm complete filling. After root filling, the coronal 1 mm of the filling materials was removed, and the spaces were filled with a temporary filling material (orafil G). The teeth were stored at 37°C at 100% humidity for 48 h to allow the sealers to set.

Push-out Bond Test

Each sample was sectioned horizontally into 2 mm thick slices at each of the three-thirds (coronal, middle and apical) of the root using a diamond disc with continuous water flow.

The cylindrical stainless steel plunger tip that closely match the size of the filling material was selected and positioned to cover as much as possible of the root filling, yet avoiding any contact with the canal walls. The vertical load at a rate of 1.0 mm/min was applied in an apical-coronal direction to avoid any constriction interference that may have been caused by the root canal taper during push-out testing. The bond strength was recorded in Mpa, by dividing the load in Newton by the area of bonded interface using.

$$\text{Bond strength (Mpa)} = \frac{\text{Load in newton}}{\text{Area of bonded surface}}$$

The data were analyzed statistically using Statistical Package for Social Sciences version 1.4 and one-way analysis of variance (ANOVA) with Tukey's *post-hoc* test for multiple comparisons were performed. The level of significance was set at $P < 0.05$.

RESULTS

The mean push-out test values for each group were as follows (Table 1) in coronal third (Graph 1) Group I (1.5 ± 0.27 Mpa), Group II (0.99 ± 0.21 Mpa), and Group III (3.77 ± 0.47 Mpa); in middle third (Graph 2) Group I (1.45 ± 0.14 Mpa), Group II (0.96 ± 0.15 Mpa), and Group III (3.43 ± 0.122); in the apical third (Graph 3) Group I (1.39 ± 0.01 Mpa), Group II (0.90 ± 0.15 Mpa), and Group III (3.3 ± 0.78 Mpa). ANOVA revealed a significant difference among the groups ($P < 0.05$).

DISCUSSION

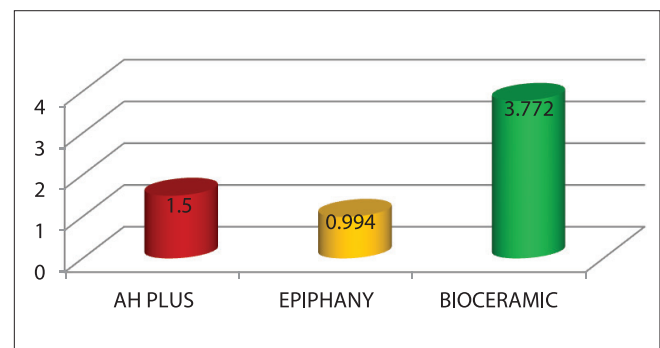
Adhesion of root canal filling material to dentinal walls is important in both static and dynamic situations.⁷

Bond strength testing has become a popular method for determining the effectiveness of adhesion between endodontic materials and tooth structure. There are different techniques to measure the bond strength of materials and push-out test is one of the most reliable methods based on the results of previous studies. In this test, the conditions are comparable to clinical conditions, in

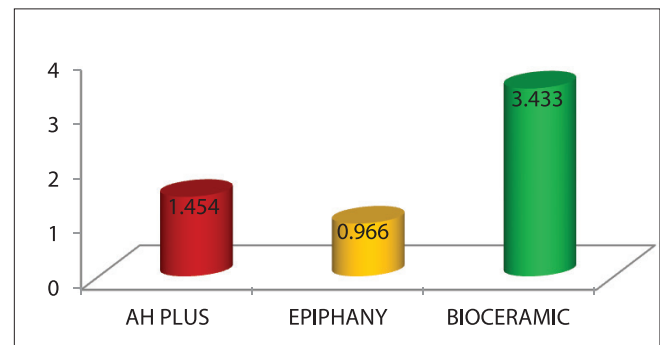
which the tested items are directly placed within prepared canals with normal tubular configuration and organization.³

About 10% formalin was utilized for preserving teeth before study. Previous studies have reported no consequential time effect of formalin on dentin bond strength.⁷ Jameson *et al.*⁸ found that covalently cross-linked Type I collagen in dentin is not significantly affected by formalin storage. It has additionally been documented that teeth stored in formalin do not experience dihydrogen monoxide loss or dehydration for up to 12 weeks of storage.

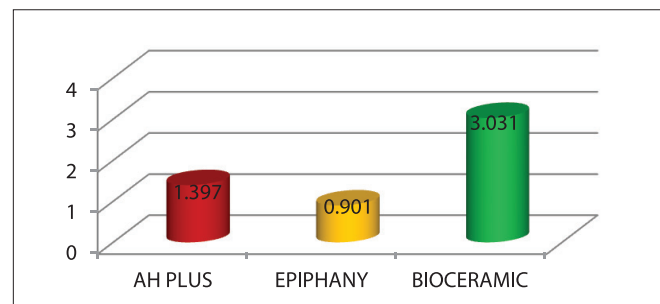
During chemo-mechanical preparation, a layer of debris, the smear layer, is formed.⁹ Some studies have shown that removal of the smear layer enhances the adhesion



Graph 1: Comparison of mean push out bond strengths at coronal third



Graph 2: Comparison of mean push out bond strengths at middle third



Graph 3: Comparison of mean push out bond strengths at apical third

Table 1: Mean push-out bond strengths in MPa at coronal, middle and apical third

Location	Group I		Group II		Group III	
	Mean (MPa)	SD	Mean (MPa)	SD	Mean (MPa)	SD
Coronal third	1.500	0.02751	0.9940	0.21609	3.7720	0.47338
Middle third	1.4540	0.14362	0.9660	0.03035	3.4330	0.12257
Apical third	1.3970	0.01826	0.9010	0.15160	3.0310	0.07838

SD: Standard deviation

of sealers to the root canal wall;^{10,11} therefore, the canals were irrigated with 3% NaOCl and a final rinse of 17% ethylenediaminetetraacetic acid for removal of smear layer. Sodium hypochlorite was not used as the final irrigating solution since it is an oxidizing agent that leads to oxidation of some component of the dentin matrix. Furthermore, oxygen has been shown to inhibit polymerization of resins, thus leading to reduced resin bond strengths.^{12,13}

The present results demonstrated that the push-out bond strengths for the coronal and middle root dentin were higher than that of the apical root dentin. This is probably due to inadequate volume or penetration of the irrigation and final rinse solutions into the apical portion of the canal¹⁴ This can be also explained by the structure of dentin in the apical region of human teeth where the number of dentinal tubules was significantly lower than that in the cervical and mid-root dentin^{15,16} The low number of dentinal tubules, the irregular structure of secondary dentin, and the presence of cementum-like tissue apically on the root canal wall result in reduced penetration of adhesives into the apical root dentin compared to coronal dentin.^{17,18}

Among the three obturating systems, Group III showed higher push-out bond strength it could be assumed that the slow-setting of the BC sealer combined with the slow expansion of the C-point when exposed to moisture may have potentially pushed the sealer into places² and The hydrophilic nature of the sealer¹⁹ may have potentially resulted in more intimate contact with the canal walls.

In this study resilon/epiphany showed the least mean push out bond strength may be because of the higher polymerization shrinkage rate of resilon/epiphany that may be involved along with the high C-factor associated with root canal.⁴

The push-out bond strength of AH Plus/Gutta-percha was higher than resilon/epiphany might be because of the ability of the epoxy resin based sealers to penetrate into the micro irregularities due to their creep capacity. Another reason might be the formation of covalent bond by an epoxide ring to amine group in collagen network.²⁰

CONCLUSION

Within the limitations of the study, it can be concluded that C-point/bioceramic sealer showed the highest push-out bond strength followed by gutta-percha/AH plus and epiphany/Resilon.

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Comparison of Small Incision Trabeculectomy (Minitrab-clear Corneal) with Conventional Trabeculectomy in Primary Open Angle Glaucoma

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Abstract

Introduction: Primary open angle glaucoma is a symptom complex wherein there is damage to the optic nerve head with characteristic morphological and functional alterations in Optic Nerve Head (ONH).

Aim: To compare the recent surgical approach minitrab with conventional trabeculectomy with reference to post-operative success.

Materials and Methods: This prospective study was done in Theni Medical College Hospital, Theni, during the period of October 2015 to April 2016 in 40 eyes of 38 patients.

Results: Age of both groups were almost the same. The most common age group in both groups was 51-60 years. Sex distribution was equal. 65% were males and 35% were females. A mean pre-operative intraocular pressure (IOP) in minitrab was 28.4 and in conventional trabeculectomy was 31.8. Success rate was equal in both groups (85%). The mean reduction in IOP in mini-trabeculectomy was 15.4 and in conventional was 17.2 mm of Hg. Bleb characteristics - in minitrab the bleb was diffuse and low-lying while in conventional bleb was with microcysts, vascularized, overhanging, and few diffuse bleb. Change in K reading was not significant in mini-trabeculectomy compared to conventional.

Conclusion: Post-operative IOP control in mini-trabeculectomy cases were equivalent to conventional trabeculectomy.

Key words: Bleb, Conventional trabeculectomy, Mini-trabeculectomy, Optic nerve hypoplasia, Primary open angle glaucoma

INTRODUCTION

Primary open angle glaucoma (POAG) is a symptom complex wherein there is damage to the optic nerve head with characteristic morphological and functional alterations in optic nerve hypoplasia (ONH).

One of the most common causes for increased intraocular pressure (IOP) is due to the defective outflow facility through the intertrabecular spaces. Although the present

standard practice is to consider medical therapy, laser surgery and incisional surgery in the sequence of treating patients with chronic POAG, a trend to earlier surgical intervention is receiving considerable attention. A procedure with less trauma to the subconjunctival tissue has been evaluated in this study.¹

MATERIALS AND METHODS

This prospective study was done in Government Theni Medical College, Theni, during the period of October 2015 to April 2016. The study was performed in 40 eyes of 38 patients with POAG. Conventional trabeculectomy was done in 20 eyes, and mini-trabeculectomy was done in 20 eyes.

Of this, there were 25 male patients and 13 female patients. Age ranged from 21 to 72 years (Table 1).

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Exclusion Criteria

One eyed patients, narrow angle glaucoma, and secondary glaucomas were excluded.

Surgical Technique

A small 2.5 mm clear corneal partial thickness incision is made just within the limbus. A crescent blade was used to perform a intra-scleral pocket extending 2-3 mm posteriorly.²

A cystitome was mounted on a syringe with balanced saltsolution (BSS) and was passed under the intrascleral pocket to its end and then rotated 90° cutting the roof of the sclera pocket and entering the sub-Tenon's space. The tip was observed under the Tenons and its position confirmed by injecting BSS which forms a sub-Tenon's bleb.³

The initial corneal incision was deepened to enter the AC and using Kelly's Punch trabeculectomy was done. A peripheral iridectomy was performed. The corneal incision was sutured with 10 0 Nylon suture. Subconjunctival steroid was given.

Conventional trabeculectomy was performed by the usual approach using Kelly's Punch.⁴ Postoperatively all eyes of both groups were put on antibiotic steroid drops. On discharge IOP, keratometry, SLE, bleb characteristics

were documented. The patients were reviewed at 1 week, 1 month and 3 months.

RESULTS AND DISCUSSION

Timolol maleate 0.5% was used in 3 cases with IOP 22-28 mm of Hg in Group 1. In all three we were able to withdraw the drug after 1-2 months of therapy which indicates that the rise in IOP was transient and not related to bleb failure due to fibrosis.

In contrast, Group 2 patients of relative success needed two drugs for IOP control, and we were not able to withdraw the drug after 2 months. This indicates that failure is due to fibrosis (Table 2).

The cases were followed up for progression of field and fundus changes. In all cases of Group 1 where IOP was good, there was no progression of field defects or fundus changes.

In Group 1, most of the patients had diffuse low-lying bleb, only one case had no bleb but had good IOP control.

In Group 2-1 had bleb with microcysts, 2 vascularized bleb one of which was in relative failure group and another in failure Group, 1 had large overhanging bleb and 6 had raised localized bleb, of which one was under relative failure group, 10 had diffuse bleb (Table 3).

The main post-operative complication expected in the cases of mini-trabeculectomy would be change in K reading and astigmatism due to the corneal incision. However, from our study, it is obvious that change in K reading in mini-trabeculectomy is not much greater than that due to conventional trabeculectomy (Table 4). Hence, from this study, we can conclude that post-operative astigmatism is not a limiting factor.

CONCLUSION

Post-operative IOP control in mini-trabeculectomy cases were equivalent to conventional trabeculectomy. Intraoperative complications such as conjunctival buttonholing, iris prolapse, and descemet's injury are almost nil. Post-operative complications such as shallow

Table 1: Age distribution

Age group (years)	n (%)	
	Mini-trabeculectomy	Conventional
21-30	1 (5)	Nil
31-40	2 (10)	1 (5)
41-50	2 (5)	1 (5)
51-60	9 (45)	10 (50)
61-70	1 (5)	Nil
71-80	1 (5)	Nil
>80	Nil	1 (5)

Table 2: Success rate

Results	n (%)	
	Mini-trabeculectomy	Conventional
Success	17 (85)	17 (85)
Relative	3 (15)	2 (10)
Failure	Nil	1 (5)

Table 3: Bleb characteristics

Type of trabeculectomy	Diffuse	Cystic	Vascularized	No Bleb	Overhanging	Raised localized
Mini-trabeculectomy	19	-	-	1	-	-
Conventional	10	1	2	0	1	6

Table 4: Change in K reading

Type of trabeculectomy	Change in K reading
Mini-trabeculectomy	0.5-0.75
Conventional	0.5-0.75

AC, choroidal effusion, overhanging bleb, cystic bleb, and leaking bleb are not seen in this procedure. Cosmetically good diffuse functioning bleb has been achieved with this procedure.

To emphasise again since we avoid traumatizing and insulting the conjunctiva and Tenons the problems related to the fibrotic activities of the conjunctiva and

Tenons are totally avoided.⁵ Hence, a perfectly done mini-trabeculectomy will definitely achieve a good post-operative IOP control with no complications.

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Left Internal Mammary Artery Versus Reversed Saphenous Vein Graft as Conduit to Left Anterior Descending Artery in South Indian Patients with Coronary Artery Disease Undergoing Coronary Artery Bypass Surgery

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Abstract

Introduction: Coronary artery disease is the most common adult disease, and the most common cause for stable/unstable angina, acute myocardial infarction, ischemic cardiomyopathy with congestive heart failure, and sudden cardiac death. Coronary artery bypass grafting (CABG) remains the most durable revascularization procedure for coronary artery disease.

Materials and Methods: A total of 40 patients of South Indian origin, with uncomplicated coronary artery disease with good LV function (left ventricular ejection fraction [LVEF] (%) 47.77 [4.94]), who were divided into two equal and comparable groups, underwent elective classical CABG in 2009. Group I had left internal mammary artery (LIMA) grafted to left anterior descending (LAD), whereas reversed saphenous vein graft (rSVG) was used in Group II. LAD diameter was 1.486 (0.19) mm. All were ventilated, with minimal inotropic support, when indicated and discharged by 7-10 days. Cardiac enzymes (troponin-T and CKMB) were analyzed 6 and 12 h after surgery and on discharge. In pre- and post-operative angina class, LVEF was assessed by clinical assessment and 2D echocardiography. Follow-up was done clinically by 2D echocardiography at 1 and 3 months.

Results: There were 2 mortalities in each group, due to low cardiac output. Group II had improvement in angina class and New York Heart Association (NYHA) Functional class, in immediate post-operative period, whereas improvement in angina class observed in Group I, during long-term post-operative follow-up. LVEF showed significant improvement Group I 59.4 (3.84) compared to Group II 52.88 (3) at 3 months follow-up. Cardiac enzyme levels were found to be significantly elevated in Group II at the time of discharge.

Conclusion: In this study, we conclude that LIMA is a better conduit than rSVG for LAD in South Indian patients undergoing CABG, in terms of improvement in angina and NYHA functional class, cardiac enzyme status and LVEF, although rSVG may give early improvement of angina class and functional class, due to smaller caliber of native LAD in our patient population.

Key words: Coronary artery disease, Coronary artery bypass grafting, Left internal mammary artery, Reversed saphenous vein graft

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INTRODUCTION

Coronary artery disease is the most common disease encountered in adults. The clinical presentation is as a result of atherosclerotic disease of the coronary arteries and includes syndromes of stable and unstable angina, acute myocardial infarction (MI), ischemic cardiomyopathy

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with congestive heart failure and is the most common cause of sudden cardiac death.¹ Coronary artery bypass grafting (CABG) still remains the most durable means of revascularization in patients of coronary artery disease.²

Vineberg used the left internal mammary artery (LIMA) for his eponymous procedure in the 1950s and reports of the LIMA as a direct coronary artery graft appeared in the late 1960s. The following Favoloro's Publication, in 1968, of a series of patients in whom saphenous vein was used as a conduit, veins eclipsed arteries as conduits for coronary artery bypass and the current success of the coronary artery bypass operation was built upon the use of saphenous vein grafts (SVG).³ The benefits of a LIMA graft to the left anterior descending (LAD) coronary artery were established in 1986.⁴

Different strategies and conduits are available for revascularization of the diseased artery out of which graft to LAD artery has always played a major role in the short- and long-term outcomes of this operation.^{3,5}

It has become clear apparent that the long-term patency of vein graft is poor, with consequent recurrent angina and impairment of ventricular function. In spite of its shortcomings, the saphenous vein remains the most commonly used conduits in coronary bypass grafting due to its ease of harvest, ready availability, versatility, resistance to spasm, and thoroughly studied long-term results. Advances in the understanding of the pathological processes and techniques in harvesting SVG have again raised the possibility of using vein graft as more and more complex cases are taken up for CABG where the hemodynamic instability constraints and early revascularization are of paramount importance.⁶

In view of these facts, this study was planned to evaluate the use of reversed saphenous vein graft (rSVG) or LIMA as graft conduit for bypassing LAD artery disease and compare the pre- and post-operative results in using these grafts in terms of improvement in angina and NYHA functional class, LVEF and cardiac enzyme levels, in South Indian patients undergoing CABG for coronary artery disease.

MATERIALS AND METHODS

Our study included 40 patients of South Indian origin, who underwent elective classical CABG for uncomplicated coronary artery disease with good LV function from January to December 2009, after obtaining clearance from institutional Ethics Committee, at Sri Venkateswara Institute of Medical Sciences, Tirupati. The patients were

randomized into two equal and comparable groups. In Group I, all 20 patients had LIMA used as conduit for grafting LAD, whereas Group II included 20 patients where rSVG was used for grafting LAD because these patients were hemodynamically not stable at the time of surgery to allow LIMA harvesting.

Exclusion Criteria

The following group of patients will not be included in the study:

- Patients of MI undergoing emergency surgery
- MI or unstable angina pectoris within 2 months before coronary angiography
- Ischemic complications of MI: Acute mitral regurgitation, ventricular septal defect, and left ventricular aneurysm
- Failed (percutaneous transluminal coronary angioplasty)
- Redo CABG
- History of (deep vein thrombosis)
- Associated valvular heart disease
- Diffuse disease of LAD or LAD <1.5 mm
- Sequential grafting of LAD
- Bilateral internal mammary artery grafting.

Pre-operative Canadian Cardiological Society (CCS) angina class, Class II NYHA functional class were noted, and LVEF was assessed by 2D echocardiography. Baseline ECG was also taken for all patients.

In all patients, general anesthesia was induced by midazolam, fentanyl, and propofol. Ventilation was controlled with oxygen and anesthesia maintained by inhalational isoflurane, propofol, and fentanyl. After induction, in Group I, poststernotomy, the LIMA was harvested, where it was decided to use for grafting LAD, using a pedicle technique. Just before dividing LIMA distally systemic heparinization was done at 3 mg/kg. In Group II, saphenous vein was harvested by open dissection started either in the upper thigh, above the knee or at the ankle. Following the vein harvesting, systemic heparinization was done at 3 mg/kg.

All operations were performed under cardiopulmonary bypass with moderate cooling and topical pericardial ice slush. Extracorporeal circulation was initiated with Sarns 9000 heart-lung machine (3M Health Care, Ann Arbor, MI, USA) using Edwards membrane oxygenator. A Sarns aortic cannula and two-stage venous cannula was used to institute coronary bypass. Cold blood cardioplegia was administered after cross clamping aorta. LIMA or rSVG was used as a conduit to bypass LAD, while for other diseased vessels rSVG was used. Once cross clamp was released, patients were gradually weaned off cardiopulmonary bypass (CPB)

and reversal of heparinization was done by full correction with protamine. Pump time and cross clamp time with a diameter of recipient vessel, patency of distal artery with the number of graft used were noted. Postoperatively inotropic support was given and if indicated.

During the immediate post-operative period, the cardiac enzyme (troponin T, CPK-MB) study was done immediately, after 6 and 12 h and at the time of discharge. Troponin T test was considered significant rise and positive if it measured >0.1 ng/ml. CPK-MB was done by qualitative assay using commercial kit in semi auto analyzer Stat fax 3300 (normal <10 IU/L).

Recovery period was closely monitored including morbidity and mortality. In well-recovered patients improvement in pre- and post-angina class and ejection fraction by echocardiography done on Philips IE 33 machine by a single cardiologist was noted at the time of discharge, then on first follow-up after 1 and 3 months of surgery.

All the data were statically evaluated using Microsoft Excel 2007 version. The values are represented as mean Standard deviation and range. Means of continuous variables were compared with paired student's *t*-test. A $P < 0.05$ was considered significant.

RESULTS

The study included 40 patients who underwent classical CABG for uncomplicated coronary artery disease from January 2009 to December 2009, of which 36 (90%) were males and 4 (10%) were females. The age ranged from 42 to 74 years (56.1 [8.91]). 14 were diabetic, 27 were hypertensive and 4 had COPD. Patients were divided into two groups of 20 patients each depending on the conduit used to graft LAD (LIMA or rSVG).

In Group I, 13 had triple vessel disease (TVD), 5 had double vessel disease (DVD) and 2 had single vessel disease (SVD), whereas in Group II, 15 had TVD, 4 had DVD and one had SVD. The CPB time in Group I ranged from 60 to 155 min (113.65 [28.09]) and 90 to 192 min (127.95 [27.2]) in Group II. Aortic cross clamp time ranged from 35 to 108 min (80.45 [24.54]) in Group I and 55 to 145 min (98.85 [19.79]) in Group II. Group I had 3.55 (1.099) mean number of total grafts, whereas Group II had 3.5 (0.68). The LAD diameter (mm) was 1.497 (0.18) in Group I and 1.475 (0.213) in Group II (Table 1). 2 patients had to be re-explored due to bleeding. There were totally 4 mortalities with 2 in each group due to low cardiac output and multiple organ dysfunction syndrome.

In Group I, 4 patients were in NYHA Class I, 10 in Class II, 5 in Class III and 1 in Class IV, preoperatively, with improvement in functional class during post-operative period, with 4 in Class I, 13 in Class II and 1 in Class III at discharge and 10 in Class I and 8 in Class II at 3 months post-operative period. In Group II, 4 patients were in NYHA Class I, 13 in Class II, 2 in Class III and 1 in Class IV, preoperatively, with improvement in functional class during post-operative period, with 6 in Class I, 10 in Class II and 2 in Class III at discharge and 8 in Class I and 12 in Class II at the end of 3 months. There was an early improvement shown in NYHA functional class in Group II but at the end of 3 months, Group I had better functional class.

In Group II, 2 patients were in CCS Angina Class I, 10 in Class II, 6 in Class III and 2 in Class IV, preoperatively, with improvement in angina during post-operative period, with 7 in Class I, 8 in Class II and 3 in class III at discharge and 15 in Class I and 3 in Class II at 3 months post-operative period. In Group II, 1 patients were in CCS Angina Class I, 8 in Class II, 9 in Class III and 1 in Class IV, preoperatively, with improvement in angina during post-operative period, with 12 in Class I, 4 in Class II and 2 in class III at discharge and 12 in Class I and 6 in Class II at the end of 3 months. There was early improvement shown in CCS Angina class in Group II but at the end of 3 months, Group I had significantly better improvement in angina (Table 2).

LVEF improvement was noted in both groups in the long term with a comparable drop in LVEF at discharge. In Group I, LVEF (%) was 48.5 (5.29) preoperatively and 46.6 (2.3) on discharge, and improved to 55.14 (3.53) at

Table 1: Patient demographics, CPB time, cross clamp time, total grafts done and LAD diameter

Demographics	Mean±SD		
Age (years)	56.1 (8.91)		
Sex (male/female)	36/4		
Comorbidities			
DM	14		
Hypertension	27		
COPD	4		
Disease parameters and surgical data	Group I (LIMA)	Group II (rSVG)	P value
CAD			
TVD	13	15	
DVD	5	4	
SVD	2	1	
CPB time (min)	113.65 (28.09)	127.95 (27.2)	>0.05
Aortic cross clamp time (min)	80.45 (24.54)	98.85 (19.79)	>0.05
Total grafts	3.55 (1.099)	3.5 (0.68)	>0.05
LAD diameter (mm)	1.497 (0.18)	1.475 (0.213)	>0.05

TVD: Triple vessel disease, DVD: Double vessel disease, SVD: Single vessel disease, LAD: Left anterior descending artery, LIMA: Left internal mammary artery, rSVG: Reversed saphenous vein graft, SD: Standard deviation

1 month and 59.4 (3.84) at 3 months post-operative visit. In Group II, LVEF (%) was 47.05 (4.58) preoperatively and 45.36 (3.18) on discharge, and improved to 49.84 (2.85) at 1 month and 52.88 (3) at 3 months post-operative visit (Figure 1).

Cardiac enzyme analysis showed that 1 patient had troponin T positive test in pre-operative period while 3 patients who expired in post-operative period also had positive troponin T test in post-operative period, out of which 2 were in Group I and 1 in Group II. CPK-MB test was <10 IU/L in 14 patients of Group I and in 11 patients of Group II (Table 3).

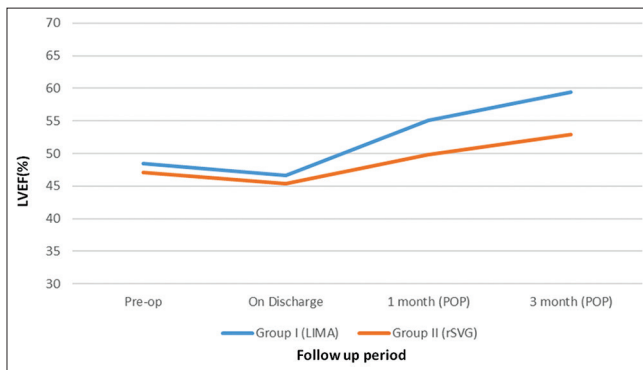


Figure 1: LVEF (%) changes in both groups during pre-operative period, on discharge, 1 and 3 months post-operative period

DISCUSSION

The number of patients undergoing coronary revascularization is rapidly increasing in recent years. Many studies have demonstrated the superiority of the Internal Mammary Artery compared to SVG as bypass graft to LAD artery (LAD).⁵⁻⁹ The long-term patency of LIMA graft to LAD is exceptional in studies, while SVG occlusion, intimal hyperplasia, and atherosclerosis are inhibiting factors for using SVG for LAD.¹⁰ Internal thoracic artery (LIMA, RIMA) has been proven to be an excellent conduit for use in CABG, favorable performance of LIMA when anastomosed to LAD partly results from endothelium-derived relaxing factor and prostacyclin produced by this artery which may be an important factor in the high patency of internal thoracic artery.⁹

CABG with SVG may result in progression of stenosis of the recipient coronary artery. This is less likely after CABG with internal thoracic artery grafts. This difference may be due to the ability of the pedicled internal thoracic artery graft to regulate flow. Thus, competitive flow in the native coronary artery is minimized.^{7,11} Saphenous veins used as conduits has been affected due to early changes in the graft which leads to its failure however it is still the most common conduit for bypassing the diseased artery.⁴ Aggressive pharmacologic strategies are being used to maximize early

Table 2: NYHA Functional class and CCS angina class changes in both groups during pre-operative, on discharge 1 and 3 months post-operative period

Parameter	n=20		n=18			
	Pre-operative		On discharge		3 months post-operative	
	Group I (LIMA)	Group II (rSVG)	Group I (LIMA)	Group II (rSVG)	Group I (LIMA)	Group II (rSVG)
NYHA functional class						
I	4	4	4	6	10	8
II	10	13	13	10	8	10
III	5	2	1	2	0	0
IV	1	1	0	0	0	0
CCS angina class						
I	2	1	7	12	15	12
II	10	8	8	4	3	6
III	6	9	3	2	0	0
IV	2	2	0	0	0	0

LIMA: Left internal mammary artery, rSVG: Reversed saphenous vein graft, NYHA: New York Heart Association, CCS: Canadian cardiological society

Table 3: Patient distribution as per CPK-MB levels - pre-operative, on discharge, 1 and 3 months post-operative period

CPK-MB level	Group I (LIMA)				Group II (rSVG)			
	Pre-operative	On discharge	1 month	3 months	Pre-operative	On discharge	1 month	3 months
<10 IU/L	14	0	0	16	11	0	0	12
10-50 IU/L	6	4	4	2	8	0	1	7
>50 IU/L	0	16	16	-	1	20	18	-

LIMA: Left internal mammary artery, rSVG: Reversed saphenous vein graft

and late venous graft patency. Prospective randomized trials have shown that early aspirin administration reduces vein graft occlusion in the 1st year after CABG.⁸ Administration of aspirin within 48 h after CABG also reduces early post-operative complications including mortality, MI, stroke, renal failure, and bowel infarction. More recently, it has been recognized that lipid-lowering agents reduce the progression of native coronary artery and graft atherosclerosis, as well as subsequent cardiovascular events. Aggressive use of statins to achieve a low-density lipoprotein cholesterol <100 mg/dl decreased by one-third the number of grafts affected with atherosclerosis at angiographic follow-up, and also decreased the need for repeat revascularization.¹¹

In our study, 40 patients were equally distributed into two groups of LIMA to LAD and SVG to LAD. Singh *et al.*⁶ in their study of internal mammary artery versus SVG, LIMA group had 33 patients, while SVG group had 43 patients, with the age group of 39 to 72 years. In our study, the mean range of patients was between 42 and 74 years. Our study showed improvement in NYHA class after 90 days, but significant improvement was seen in CCS-FC, more so in patients where LIMA was used as conduit to bypass LAD. However, Goldman *et al.*¹⁰ did not show significant improvement in CCS-FC between SVG and LIMA graft group but suggested that symptomatic improvement in angina symptoms was seen in those patients who had a wider diameter of recipient vessel at the time of grafting.

In our study 90 days, LV ejection fraction in Group I (LIMA) improved from 48.5 (5.29) to 59(3.84), whereas in Group II (rSVG), it improved from 47.05 (4.58) to 52.88 (3.0). Berger *et al.*¹² study divided the post-operative group into patent and occluded arterial group based on post-operative coronary angiography and could not show significant improvement in immediate post-operative period. Edwards *et al.*¹³ concluded that EF is also an independent factor to predict mortality after CABG and found that LIMA group with EF<50% ejection fraction in pre-operative improved significantly in post-operative period compared to SVG with low ejection fraction.

Evaluation of cardiac enzymes after cardiac surgery was also evaluated in our study which showed rise of CK-MB in all post-operative CABG patients. However, we found that Troponin T test was not positive in all post-operative CABG patients and was more sensitive in predicting fatal outcome after CABG as all patients who expired in our study had positive Troponin T test. This is also confirmed by Costa *et al.*¹⁴ as well as by Januzzi *et al.*¹⁵ in their study of comparison of cardiac Troponin T and Creatine Kinase-MB for patient evaluation after cardiac surgery.

The most common lesion in LIMA group was proximal and mid LAD, while the most common lesion in SVG group was in proximal LAD, which also has an influence on the patency of graft as was suggested by Boylan *et al.*⁷ and Edwards *et al.*¹³ who stressed the importance of tightness of lesion as well as diameter of grafted vessel as predictor of long-term patency of the graft.

Diabetes, hypertension, and COPD were major comorbid factors in our study which has been also in studies by Goldman *et al.*,⁸ Edwards *et al.*,¹³ and Boylan *et al.*⁷

We had 10% mortality in LIMA group and 5% mortality in SVG group which is almost similar with other contemporary studies by Boylan *et al.*⁷ and Edwards *et al.*¹³ However, Boylan had more mortality in SVG group compared to LIMA group but his study did not have any mention about short- and long-term mortality after CABG while in our study mortality was in the immediate post-operative period of CABG, the reason may be due to limited period of our study.

In fact, Edwards *et al.*¹³ showed that LIMA patency in post-operative period is an issue for immediate deaths in post CABG patients and is dependent on harvesting techniques, lumen size, post-operative hemodynamic, and use of inotrope.

All the studies which used either LIMA to LAD or SVG to LAD found more long-term benefit using LIMA graft.^{7-10,12,13} In our study, we also found strong indication of using LIMA to LAD due to improvement in angina class and LV function, but the final confirmation is possible only after direct visualization by angiography to see patency of either LIMA or SVG grafts, this has been a limitation in our study as no patient underwent post CABG coronary angiography.

We conclude that, whenever possible LIMA should be used as a bypass conduit in LAD lesion due to its long-term benefits in improving the symptoms as well as LV function, however meticulous harvesting techniques, good anastomosis, wide recipient coronary artery and proper hemodynamic management can make it the best bypass conduit in the patients of LAD disease undergoing CABG.

Our study had several limitations and shortcomings including small study population, shorter period of follow-up, and inability to demonstrate long-term graft patency by coronary angiography.

CONCLUSION

In this study, we conclude that LIMA is a better conduit than rSVG for LAD in South Indian patients undergoing

CABG, in the long term, in terms of improvement in angina and NYHA functional class, cardiac enzyme status and LVEF, although rSVG may give early improvement of angina class and functional class, due to smaller caliber of native LAD in our patient population. Hence, we stress on the meticulous harvesting of LIMA and its usage in LADs which are at least more than 1.25 mm in diameter.

Clinical outcome of the study is comparable with the contemporary literature which also recommends the LIMA as first and best option and SVG as the next best option for LAD, and we also suggest the same options for South Indian patients undergoing CABG.

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Clinical Analysis of Lethality in Perforated Peptic Ulcer

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Abstract

Background: Worldwide, variations in demography, socio-economic status, *Helicobacter pylori* prevalence, prescription of drugs, and different food habits make difficult to identify the definitive factors causing lethality for this condition. The objective of this study was to find the cause and contributing risk factors in rural India, which affect prognosis in terms of morbidity and mortality of patients.

Methods: It is an analytical prospective study of 60 cases of perforated peptic ulcers with peritonitis, which are seen and treated over a period of 3-year.

Results: The results show older patients above 65 are with more morbidity (87.5% vs. 42.3%) and more mortality (25% vs. 1.9%). Morbidity is more in females (66.7% vs. 46.3%) and mortality is more in males (5.6% vs. 0.0%). Shock on admission has mortality (7.7%) and morbidity (76.9%). Timing of surgery after 24 h is associated with high morbidity (73.7%) and mortality (7.9%). Purulent peritoneal collection has got mortality (11.1%) and morbidity (85.2%), duodenal site perforation mortality (6.7%) and morbidity (44.4%). 4 non-steroidal anti-inflammatory drug patients (6.7%) with more morbidity (50% vs. 25%) and more mortality (5.4% vs. 0.0%). Smoking patients 35 (58.3%) with more morbidity (57.4% vs. 36%) and more mortality (5.7% vs. 5.4%). Alcoholics patients 32 (53.3%) with more morbidity (50% vs. 46.4%) and less mortality (5.7% vs. 4%). Comorbid conditions are with more morbidity (80.0% vs. 45.5%) and more mortality (20.0% vs. 3.6%).

Conclusions: In our study, age 65 years and more, presence of shock on admission, higher anesthesiologists grade, duration of perforation of more than 24 h before surgery and purulent peritoneal collection were statistically significant predictors of morbidity and/or mortality.

Key words: After 24 h, Co-morbid condition, Perforated peritonitis, Prognostic factor, Shock

INTRODUCTION

Perforated peptic ulcer is the most common cause among all causes of gastrointestinal (GI) tract perforations which is an emergency condition of the abdomen that requires early recognition and timely surgical management.¹ It allows entry of gastric and duodenal contents into the peritoneal cavity resulting in initial

chemical peritonitis and further bacterial contamination which lead to suppurative peritonitis. There is a changing trend in the occurrence of complications in peptic ulcer disease from morbid gastric outlet obstruction to lethal perforation of peptic ulcer which is a major life-threatening complication. The mainstay of management of perforated peptic ulcer peritonitis is surgery. Endoscopic, laparoscopic, and laparoscopic-assisted procedures are now increasingly being performed instead of conventional laparotomy and simple closure of perforation with the omental patch.^{2,3} In spite of advanced surgical techniques, antimicrobial therapy, and intensive surgical care, the management of peritonitis has high lethality in terms of morbidity and mortality. The spectrum of this disease in India is different from that of the western world.⁴ Hence, the study was undertaken

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to evaluate the causes and contributing risk factors which influence the outcome of the patient.

METHODS

This is an analytical prospective study of 60 cases operated for perforated peptic ulcer peritonitis admitted to Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana State, located in South India. This study was mainly conducted to evaluate the cause and contributing risk factors, which affect prognosis in terms of mortality and morbidity of the patient.

Inclusion Criteria

Patients with peptic ulcer perforation of age >14 years, who will undergo simple closure with the omental patch as a standard operative procedure.

Exclusion Criteria

Pediatric patients of age <14 years presenting as peptic ulcer perforation, patients presenting as recurrent perforation or stomal ulcer perforation, who will undergo other than simple closure of perforation.

Study Design and Methods

This study was an analytical prospective study of 60 patients of perforated peptic ulcer peritonitis who were admitted in surgery department over a period of 3-year from March 2014 to April 2016 after institutional ethical committee approval and patient consent. All patients were interviewed, examined, findings were documented under following headings: (a) Demographical data (age, gender), (b) clinical features (duration of disease, before 24 h or after 24 h shock with grade at time of admission, (c) history of (dyspepsia, alcoholism, smoking, non-steroidal anti-inflammatory drugs [NSAIDs] usage), (d) associated comorbid conditions (hypertension and diabetes), and (e) operative findings (gastric, duodenal, bilious, and purulent).

All the diagnosed peptic ulcer perforations were operated as simple closure with omental patch. Patients were followed up every day with continuous bedside monitoring of vital data in the immediate post-operative period. After satisfactory improvement, patients were discharged from the hospital with advice regarding diet, antiulcer drugs and quitting of smoking/alcohol, etc., All the patients were instructed to come for regular follow-up. The results were analyzed and compared with available published literature in the form of tables and charts.

RESULTS

The results show older patients above 65 are with more morbidity (87.5% vs. 42.3%) and more mortality (25% vs. 1.9%). Morbidity is more in females (66.7% vs. 46.3%) with $P = 0.6$ and mortality is more in males (5.6% vs. 0.0%) with $P = 0.72$. Shock on admission has mortality (7.7%) and morbidity (76.9%). Timing of surgery after 24 h is associated with high morbidity (73.7%) and mortality (7.9%). Purulent peritoneal collection has got mortality (11.1%), morbidity (85.2%), duodenal site perforation mortality (6.7%), and morbidity (44.4%). Associated risk factors are NSAID usage in 4 patients (6.7%) with more morbidity (50% vs. 25%) with $P = 0.19$ more mortality (5.4% vs. 0.0%) with $P = 0.77$. Smoking in 35 patients (58.3%) more morbidity (57.4% vs. 36%) with $P = 0.1$, more mortality (5.7% vs. 5.4%) with

Table 1: Various factors affecting morbidity in patients with PUP

Parameter	N	Morbidity	Percentage	P
Sex				
Males	54	25	46.3	0.6
Females	6	4	66.7	
Age (years)				
<65	52	22	42.3	0.02
≥65	8	7	87.5	
Drug (NSAID+steroid)				
Present	4	1	25.0	0.19
Absent	56	28	50.0	
H/O smoking				
Present	35	20	57.1	0.1
Absent	25	9	36.0	
H/O alcohol				
Present	32	16	50.0	0.78
Absent	28	13	46.4	
Associated illness				
Present	5	4	80.0	0.14
Absent	55	25	45.5	
Time of surgery (hrs)				
≤24	22	1	4.5	<0.001
>24	38	28	73.7	
Shock				
Present	26	20	76.9	<0.001
Absent	34	9	26.5	
H/O PUD				
Present	7	3	42.9	0.75
Absent	53	26	49.1	
ASA Grade				
I	0	0	0.0	<0.001
II	41	13	31.7	
III	16	13	81.3	
IV	3	3	100.0	
Hb				
<11	10	4	40.0	0.56
>11	50	25	50.0	
Peritoneal collection				
Bilious	33	6	18.2	<0.001
Purulent	27	23	85.2	
Site				
Duodenal	45	20	44.4	0.29
Gastric	15	9	60.0	

$P = 0.77$, alcohol in 32 patients (53.3%) more morbidity (50% vs. 46.4%) with $P = 0.78$, less mortality (5.7% vs. 4%) with $P = 0.7$, history of dyspepsia in 7 patients (11.7%) are with less morbidity (42.9% vs. 49.1%) with $P = 0.75$, less mortality (0.0% vs. 5.7%) with $P = 0.68$, associated comorbid conditions are with more morbidity (80.0% vs. 45.5%) with $P = 0.14$ and with more mortality (20.0% vs. 3.6%) with $P = 0.23$. They are hypertension in 2 patients, diabetes in 1 patient, and congestive cardiac failure in 1 patient (Tables 1 and 2).

DISCUSSION

This prospective analytical study shows lethality of the patient in the form of mortality and morbidity. The present

Table 2: Various factors affecting mortality in patients with PUP

Parameter	N	Morbidity	Percentage	P
Sex				
Males	54	3	5.6	0.6
Females	6	0	0.0	
Age (years)				
<65	52	1	1.9	0.001
≥65	8	2	25.0	
Drug (NSAID+steroid)				
Present	4	0	0.0	0.77
Absent	56	3	5.4	
H/O smoking				
Present	35	2	5.7	0.7
Absent	25	1	4.0	
H/O alcohol				
Present	32	1	3.1	0.41
Absent	28	2	7.1	
Associated illness				
Present	5	1	20.0	0.23
Absent	55	2	3.6	
Time of surgery (h)				
≤24	22	0	0.0	0.24
>24	38	3	7.9	
Shock				
Present	26	2	7.7	0.39
Absent	34	1	2.9	
H/O PUD				
Present	7	0	0.0	0.68
Absent	53	3	5.7	
ASA grade				
I	0	0	0.0	-
II	41	0	0.0	
III	16	0	0.0	
IV	3	3	100.0	
Hb				
<11	10	0	0.0	-
>11	50	3	6.0	
Peritoneal collection				
Bilious	33	0	0.0	-
Purulent	27	3	11.1	
Site				
Duodenal	45	3	6.7	-
Gastric	15	0	0.0	

ASA: Anesthesiologists

study was with 5% mortality and 48.3% morbidity. The various studies show 6-10% mortality.⁴ The present study mortality is at the lower limit. In the study by Testini *et al.* (2003), male-female ratio was 2.9:1 and that in a study by Sharma *et al.* (2006)⁸ was 18.2:1. The present study matches with Kocer *et al.* (2007) with ratio of 8:1. In our study, 90% were males and 10% were females, and the male-female ratio being 9:1. The identified prognostic factors are age of the patient, timing of surgery, shock on admission, purulent peritoneal collection (11.1%), and duodenal site perforation (6.7%). In a study by Kocer *et al.*, in 2007, patients older than 65 years had a higher morbidity rate (56.6% vs. 16.2%) and mortality rate (37.7% vs. 1.4%) when compared to younger patients. In a study by Dakubo *et al.*, in 2009, patients older than 60 years had a higher mortality rate (26.5% vs. 6.8%) when compared to younger patients, the compared results were represented in Table 3. In our study also, 25% mortality with significant $P = 0.001$. Timing of surgery after 24 h associated with high mortality (7.9%) which revealed in other studies (Dakubo 11.8%, Kocer 20%, and Testini 9.8%) has got higher mortality. Shock on admission has 7.7% mortality compared with other studies (Dakubo 20.6%, Kocer 68.8%, and Testini 55.5%) has got higher mortality which was compared in Table 4. In the study by Kocer *et al.*, in 2007, each increase in anesthesiologists (ASA) score increased morbidity 2 times and mortality 4.5 times in their patients.⁶ The post-operative complication rate of the present study is 87.5% in above 65 age, 85% in purulent peritoneal fluid patients, and 76.9% in patients with shock. This signifies morbidity of the patient with comparing to other studies (Kocer 56.6%, Dakubo 20.6%) has got age-related morbidity. Alcohol intake,⁹ smoking, NSAID usage, and history of dyspepsia have lethal effect on both mortality and morbidity of the patient. Associated comorbid condition has definitive lethal effect on the patient.

In our study, 45% patients had purulent peritoneal collection and 55% patients had bilious peritoneal collection. 85% of patients with purulent peritoneal collection developed

Table 3: Morbidity and mortality in patients with PUP in different age groups

Parameter	Morbidity and mortality	Age of patients	
		<65 years	≥65 years
Kocer <i>et al.</i> (2007)	Number of patients	216	53
	Mortality n (%)	35 (16.2)	30 (56.6)
	Mortality n (%)	3 (1.4)	20 (37.7)
Dakubo <i>et al.</i> (2009)*	Number of patients	220	34
	Mortality n (%)	55 (25.0)	7 (20.6)
	Mortality n (%)	15 (6.8)	9 (26.5)
Present study	Number of patients	52	8
	Mortality n (%)	22 (42.3)	7 (87.5)
	Mortality n (%)	1 (1.9)	2 (25.0)

*Age >60 years

Table 4: Mortality depending on time of surgery and shock on admission in patients with PUP

Parameter	Time of surgery n (%)	Shock			
		≤24 hrs	>24 hrs	Present	Absent
Testini <i>et al.</i> ⁵	Number of patients	41	108	9	140
	Mortality	5 (1.9)	11 (9.8)	5 (55.6)	1 (0.7)
Kocer <i>et al.</i> ⁶	Number of patients	189	80	16	253
	Mortality	7 (3.7)	16 (20.0)	11 (68.8)	12 (4.7)
Dakubo <i>et al.</i> ⁷	Number of patients	118 (8)	136 (16)	34 (7)	220
	Mortality	8 (6.8)	16 (11.8)	7 (20.6)	14 (6.4)
Present study	Number of patients	22	38	26	34
	Mortality	0 (0)	3 (7.9)	2 (7.7)	1 (2.9)

post-operative complications, i.e., 5 times more compared to patients with the bilious peritoneal collection. Wound infection was common post-operative complications in patients with the purulent peritoneal collection.

CONCLUSION

In the analysis of 60 patients, age above 65 years, duration of perforation of more than 24 h before surgery, the presence of shock on admission with high ASA grade and purulent peritoneal collection were statistically significant predictors of mortality and morbidity. Each increase in ASA status caused an increase in the morbidity risk by 2 times. Shock on admission increased morbidity 3 times, delayed surgery (after 24 h) increased morbidity 15 times, and patients with purulent peritoneal collection had 5 times increased the risk. Duodenal perforation more lethal than gastric.

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Intraoperative Lavage in Peritonitis: Comparison between Saline and Metronidazole

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Abstract

Background: Intraoperative peritoneal lavage plays an important role in a treatment of peritonitis. Sterile water, warm saline, and povidone-iodine are most commonly used for the purpose of peritoneal lavage. But now, the addition of antibiotics in these fluids is supposed to give better results. Among various antibiotics, metronidazole has proved to be most beneficial in treating the peritonitis.

Materials and Methods: A total of 100 patients were randomly divided into two categories. Group S patients received intraoperative peritoneal lavage with 2 L of saline water. Group M patients received intraoperative peritoneal lavage using 2 L of saline mixed with 200 mL of metronidazole. Results of both the groups were analyzed statistically with the help of *t*-test. The *P* < 0.05 was considered statistically significant.

Results: The most common etiology of peritonitis was a duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%). The incidence of infection (both wound infection and sepsis) is statistically high in the group receiving saline peritoneal lavage. In other parameters like incidence of abscess and fistula formation, mortality rate and duration of stay in hospitals no statistically significant difference was found.

Conclusion: Intraoperative peritoneal lavage with metronidazole in the patients of peritonitis is more beneficial as to saline. The occurrence rate of complications is found to be more in patients receiving saline for peritoneal lavage as related with antibiotic like metronidazole.

Key words: Metronidazole, Peritoneal lavage, Saline

INTRODUCTION

Peritonitis is defined as the inflammation of thin tissue layer surrounding the abdominal organs. Acute generalized peritonitis is considered as the surgical emergency. Sequestration of fluid and electrolytes result in electrolyte imbalance leading to hypovolemia and finally shock or acute renal failure. The most common etiology of peritonitis is infection resulting in perforation or rupture of viscera.^{1,2}

General supportive measures such as maintenance of hydration, correction of electrolytes imbalance, and

intravenous antibiotics are provided. The mainstay of the treatment in case of perforation is the surgical closure. Along with this, intraoperative peritoneal lavage plays an important role in the treatment of peritonitis.³⁻⁵ The mode of action of this method is that it decreases the load of bacteria, thus reducing the severity of disease and hastens the recovery of the patient.⁶

Traditionally, sterile water, warm saline, and povidone-iodine are most commonly used for the purpose of peritoneal lavage. Some researchers recommend the addition of antibiotics in these fluids for better results. Among various antibiotics, metronidazole has proved to be most beneficial in treating the peritonitis.⁷⁻⁹

Metronidazole is an antibiotic and antiprotozoal drug. It is used either alone or with other antibiotics to treat pelvic inflammatory disease, endocarditis, bacterial vaginosis, dracunculiasis, giardiasis, trichomoniasis, and amoebiasis. Common side effects include nausea, metallic taste, loss of

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appetite, and headaches. It inhibits nucleic acid synthesis by disrupting the DNA of microbial cells.^{10,11}

Different studies^{4,12-14} suggest that saline lavage reduces significantly counts in peritoneal fluid of aerobic and anaerobic bacteria in peritoneal fluid. Despite the profound reduction in peritoneal bacterial counts the rate of post-operative sepsis, wound infection, intra-abdominal abscess and septicemia were extremely high. These results indicate that saline peritoneal lavage alone is no substitute for short-term antimicrobial prophylaxis. Still the literature regarding the advantage of using antibiotics along with sterile water for peritoneal lavage is lacking. Hence, this study is conducted to compare the effect of sterile warm water and antibiotics for the purpose of peritoneal lavage.

MATERIALS AND METHODS

This study was conducted in the Department of General Surgery, TMMC & RC, Moradabad for the duration of 1 year. A total of 100 patients aged between 15 and 60 years were included in this study, out of which 75 were males and 25 were females. All these patients underwent laparotomy for the treatment of peritonitis.

All these patients presented with clinical features of peritonitis. Blood tests, erect X-ray abdomen, and USG abdomen also show positive results. These patients were randomly divided into two categories. Group S patients received intraoperative peritoneal lavage with 2 L of saline water. Group M patients received intraoperative peritoneal lavage using 2 L of saline mixed with 200 mL of metronidazole.

Duration of stay in the hospital was observed. The patients were followed postoperatively until the discharge and 1 month after discharge. Any type of early or late complications like localized or general infection, abscess formation, fistula and death were noticed.

Results of both the groups were analyzed statistically with the help of *t*-test. The $P < 0.05$ was considered statistically significant.

RESULTS

This study included 100 patients out of which 75 were males and 25 were females. 42% of patients belonged to the age group of 25 to 40 years. The most common etiology of peritonitis was duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%) (Figure 1).

In the case of perforation, the primary treatment was closure of opening followed by peritoneal lavage. The duodenal perforation was the commonest followed by gastric, ileal, and jejunal. In some cases of bowel ischemia and traumatic injury, resection and anastomosis of bowel were done. Few patients of ileal perforation underwent ileostomy.

The incidence of infection (both wound infection and sepsis) is statistically high in Group S, which suggests that peritoneal lavage with metronidazole is better than the saline ($P < 0.05$). Besides this incidence of intra-abdominal abscess formation is also high in Group S as compared to the Group M, but it is statistically insignificant ($P > 0.05$). Other complications were rare in both the groups (Table 1, Figure 2).

In the majority of the patients, the duration of the hospital stay was less than a week (70%). However, no statistically significant difference was found in the two groups ($P > 0.05$) (Table 2).

DISCUSSION

The patients in this study belonged mainly to age group 25-40 years which is comparable to age distribution

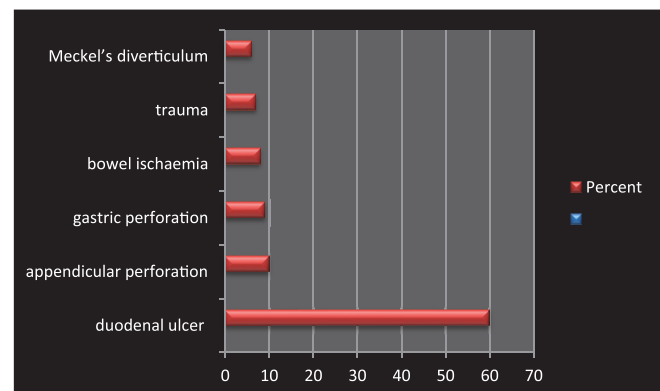


Figure 1: Bar diagram depicting the etiology (%) of peritonitis

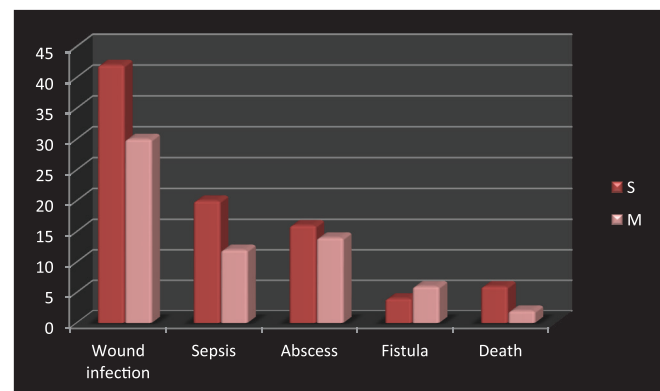


Figure 2: Comparison of the percentage of incidence of complication in two groups

Table 1: Incidence of complications in two groups

Complication	n (%)	
	Group S (n=50)	Group M (n=50)
Wound infection	21 (42)	15 (30)
Sepsis	10 (20)	6 (12)
Abscess	8 (16)	7 (14)
Fistula	2 (4)	3 (6)
Death	3 (6)	1 (2)

Table 2: Comparison of the duration of stay in the hospital in two groups

Duration of hospital stay	<7 days	>7 days	P value
Group S	31	19	>0.05
Group M	39	11	>0.05

in the study by Dalvi *et al.*¹⁰ The difference in the mean age of patients in both the groups was statistically insignificant. Similarly, the male predominance was found in both the studies.

According to a study by Sulli and Rao,¹⁵ duodenal perforation is the most common etiology of peritonitis followed by gastric perforation, trauma and bowel ischemia. In this study also, duodenal perforation was found to be the leading etiology of peritonitis. Other common causes were appendicular perforation, gastric perforation, bowel ischemia, trauma, and Meckel's diverticulum.

Different studies were done to compare the effect of different antibiotics and saline in the peritoneal lavage. One of the studies done by Schein *et al.*,⁹ no statistically significant difference was found in the chloramphenicol and saline peritoneal lavage. In our study, statistically significant reduction in the incidence of localized and generalized infection was found after use of metronidazole for intra-abdominal peritoneal lavage. This finding is similar to Dalvi *et al.*,¹⁰ who reported 20% reduction in the incidence of wound infection.

In this study, there was a reduction in the occurrence of intra-abdominal abscess in the patients undergoing metronidazole peritoneal lavage as compared to saline lavage, but it was not statistically significant. In a similar study by Fowler,¹⁶ 16% decrease in the incidence of this complication was found when they compared the use of saline and cephaloridine.

Other complications like fistula formation showed no statistically significant reduction in the present study. This finding is supported by other studies such as Dalvi *et al.*¹⁰ and Sulli and Rao.¹⁵

In this study, the mortality rate was higher in the Group S as compared to Group M. This might be due to increase in the incidence of infection, both localized and generalized in Group S. However, this difference was statistically insignificant. Likewise, Schein *et al.*⁹ found no significant difference in the outcome between the patients undergoing peritoneal lavage with saline and chloramphenicol. In another study, Rambo *et al.* also said that intraoperative peritoneal lavage with saline and cephalothin also does not affect the outcome significantly. In contrast to our study, significant difference was found in the patients receiving intraoperative peritoneal lavage with saline and other antibiotics by Bhushan *et al.*¹⁴

CONCLUSION

About 42% of patients of peritonitis belonged to the age group of 25 to 40 years. There is a male preponderance with male:female ratio of 3:1. The most common etiology of peritonitis was duodenal ulcer in 64% of patients. Other reasons were appendicular perforation (13%), gastric perforation (9%), bowel ischemia (7%), trauma (4%), and Meckel's diverticulum (2%). The incidence of infection (both wound infection and sepsis) is statistically high in the group receiving saline peritoneal lavage. In other parameters like the incidence of abscess and fistula formation, mortality rate and duration of stay in hospitals no statistical difference was found. Thus, we conclude that intraoperative peritoneal lavage with metronidazole in the patients of peritonitis is more beneficial as compared to saline.

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Awareness of Diabetic Retinopathy in Rural Population in South Tamil Nadu

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Abstract

Introduction: Diabetes mellitus is a major non-communicable disease which has alarmingly increased in prevalence in the past two decades.

Aim: To assess the awareness and practice relating to diabetic retinopathy (DR) in diabetes individuals attending ophthalmology out-patient department (OPD) at a tertiary care hospital located in a rural area in south India.

Materials and Methods: A total of 200 diabetes patients attending OPD of Ophthalmology Department in GTMCH, Theni, from October 2015 to December 2015 were given the questionnaire and their awareness about DR vision and were assessed. The study also included data regarding their demographic details, literacy levels awareness of risk factors, and management of DR. The results were statistically analyzed using Epi Info software downloaded from the customer data center website.

Results: In our study, 40 (20%) knew that ocular involvement in diabetes was related to duration of diabetes, 42 (21%) felt that lack of blood sugar control was a risk factor for the development of DR. Awareness regarding other risk factors - obesity (11.5%), hypertension (9.5%), smoking (4.5%), and high cholesterol (5.5%). About 77 (38.5%) patients knew that DR was treatable and 27 (13.5%) knew regarding laser, 9 (4.5%) knew regarding surgery, 18 (9%) knew regarding food control of diabetes, and 23 (11.5%) knew about drugs and injections into the eye. It was also noted that in patients who had a history of hypertension, the knowledge of DR was high (26%).

Conclusion: Our study helps in identifying the lacunae of awareness in the present rural diabetic population and hence insists on more awareness camps to educate the patients regarding DR. Its risk factors management options and lifelong follow-up.

Key words: Awareness, Cataract, Diabetic retinopathy, Glaucoma, Hypertension

INTRODUCTION

Diabetes mellitus (DM) is a major non-communicable disease which has alarmingly increased in prevalence in the past two decades.¹ Although patients may be aware of DM, awareness of ocular complications due to long-standing DM is very minimal, mainly in rural population. Hence, the levels of awareness of diabetic retinopathy (DR)¹ in DM patients were evaluated in rural population.² Type II DM is a major non-communicable disease which is alarmingly

increasing in the past two decades it is estimated that there will be 195% increase in persons with diabetes by 2024 and hence is a major public health concern both in developed and developing countries. The estimated increase of DM is approximately from 30 million in 2000 to 80 million in 2030 in developing countries.³

MATERIALS AND METHODS

The patients attending out-patient department (OPD) of Ophthalmology Department in Government Theni Medical College Hospital, Theni, from October to December 2015 were given a questionnaire and their awareness about DR; vision loss and treatment were assessed. The study also included data regarding their demographic details, literacy levels, and awareness of risk factors in the management of DR.

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A hospital based cross-relational study was conducted among 100 diabetic patients attending our ophthalmic OPD of Government TMC between October and December 2015 and an informed consent was obtained from all subjects. We prepared a questionnaire to assess the knowledge of DR, vision loss, treatment options available for DR. The questionnaire was prepared in the local language (Tamil).

Sample Size

About 200 diabetic patients attending OPD of GTMC referred from Andipatti, Usilampatti and nearby PHCs and district hospitals from October 2015 to December 2015 were assessed.

Data Collection

Basic data collected were name, age, sex, occupation, locality, literacy, socio-economic status, duration of DM, regularity of treatment, and control of DM. The target population was rural, diabetic people, and their awareness was assessed. The questionnaire was prepared in the local language as the target group was rural people. The junior residents were trained to administer the questionnaire and help the patients in filling it up. When the patients were illiterate the questionnaire was read, and their answer was recorded by junior residents.⁴

Assessing Knowledge of DR

1. Can eyes be damaged by DM?
2. What eye problems can individuals with DM have?

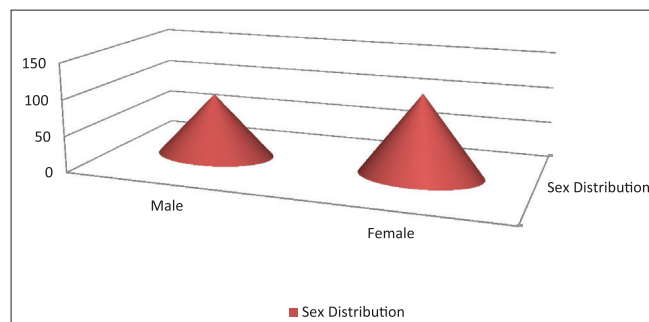


Figure 1: Sex distribution

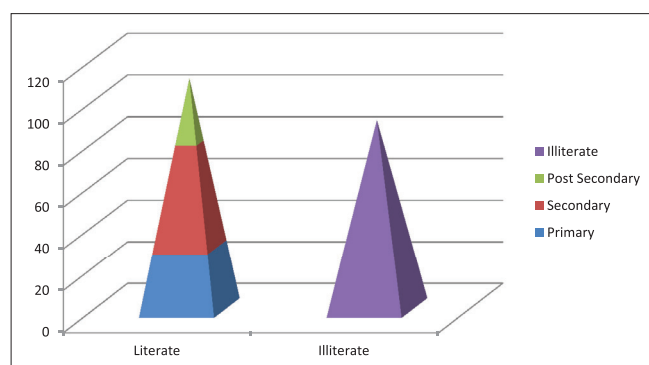


Figure 2: Literacy Levels in the study

3. Knowledge of risk factors leading to DR
4. Knowledge of treatment options for DR
5. Options of treatment
6. Behavioral modifications due to attitude toward necessity of eye check-up for diabetics and frequency of follow-up
7. Does good control of diabetic status result in avoiding visit to an ophthalmologist?

The responses were grouped yes or no or not sure. The patients were then categorized into knowledge group for DR if the patient was aware of vision loss, risk factors and treatment options and the prime inclusion based on being answered with a yes for “can eyes be damaged by DM?”

After the questionnaire was answered, the patients were subjected to detailed ocular examination including vision, IOP, slit lamp examination, and dilated fundus examination.

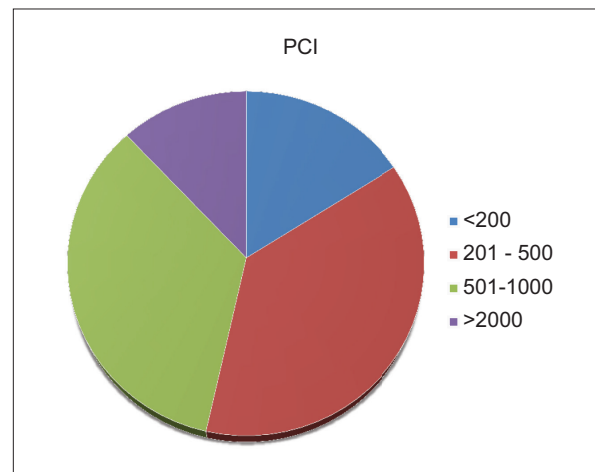


Figure 3: Socio-economic status

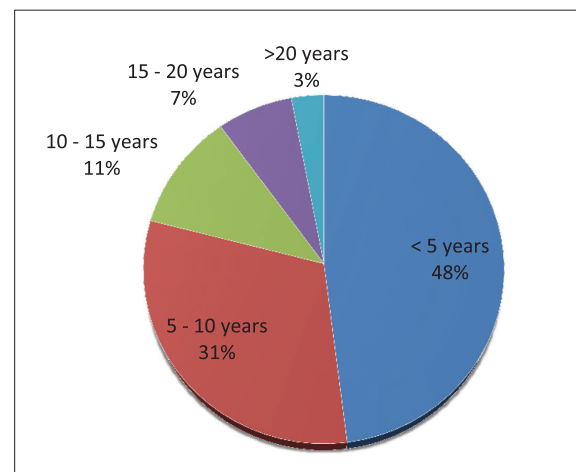


Figure 4: Duration of diabetes mellitus

Statistical Analysis

The results were statistically analyzed with the help of Epi Info (version 11.0) software downloaded from the customer data center website. Determinants of awareness of DR, eye problems with DR, Risk factors leading to DR, treatment for DR such as age, gender, literacy, SES, locality, and occupation were analyzed.

RESULTS

We received responses from 200 patients diagnosed with Type 2 diabetes, attending ophthalmology OPD at our hospital. It was observed that the age distribution of diabetics was predominantly from 40 to 70 years. It peaked at 60-70 years (34.5%), and there was mild female preponderance (56%) with female numbering 112 and 88 were men accounting to 44% (Figure 1). The mean age was 58.32 years.

About 110 were literates and 90 were illiterates accounting to 55% and 45%, respectively (Figure 2). Table 1 shows demographic and literacy profiles of all subjects. Diabetes of <5 years duration was seen in 96 (48%) individuals and of more than 20 years duration in 6 (3%) individuals with a statistically significant $P < 0.001$ (Figure 4). Comorbid conditions such as hypertension were noted in 52 (26%)

of individuals. The family history of diabetes was noted in 37 (18.5%) (Figure 5).

Figure 6 shows awareness regarding type of eye damage. The results regarding the type of eye damage in Type 2 diabetes showed that 31.5% of patients knew that diabetes could cause reduced vision, 28% felt it could cause blindness, 19% knew that diabetics could develop cataracts, 1% knew that it would cause glaucoma, and 22% knew that it would cause retinopathy.

Questions were asked pertaining to knowledge of risk factors leading to DR and the results are shown in Table 2.

Table 1: Single table analysis

Factor	n (%)	P value	OR
Age			
Gender			
Male	88 (44)	0.0082>0.001	0.78
Female	112 (56)		
Education			
Literate	110 (55)	0.0228<0.01	1.2
Primary	29 (26.36)		
Secondary	50 (45.45)		
Post-secondary	31 (28.18)		
Illiterate	90 (45)		
Comparison P value		<0.0001	
Comparison odds for literate versus illiterate			
Duration of DM (years)			
<5	96 (48)	<0.0001	3.76
5-10	62 (31)		
11-15	22 (11)		
16-20	14 (7)		
>20	6 (3)		
Comparison P value		<0.0001	
Comparison odds for less than and more than 10 years			
Per capita income			
<200	32 (16)	0.08>0.01	1.15
201-500	75 (37.5)		
501-1000	69 (34.5)		
>2000	24 (12)		
Comparison P value		0.08>0.01	
Comparison odds for less than and more than 500			
Hypertension			
Present	52 (26)	<0.001	0.35
Absent	148 (74)		
Comparison P value		<0.001	
Family H/o of DM			
Present	37 (18.5)	0.22	
Absent	163 (81.5)		
Knowledge of risk factors			
Yes	144 (72)	<0.001	2.57
No	56 (28)		
Comparison P value		<0.001	
Knowledge of treatment			
Yes	77 (38.5)	0.0023<0.01	0.62
No	123 (61.5)		
Comparison P value		0.0023<0.01	

OR: Odds ratio, DM: Diabetes mellitus

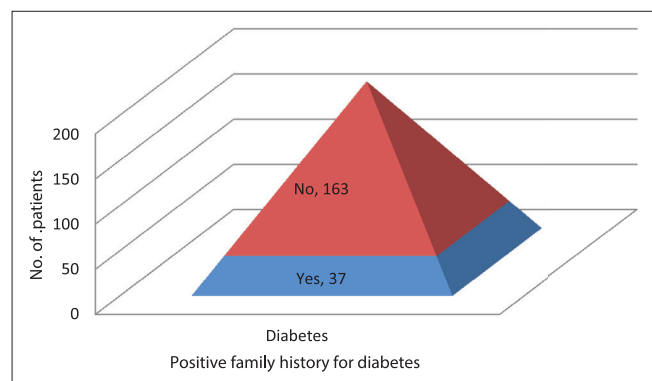


Figure 5: Family history of diabetes mellitus

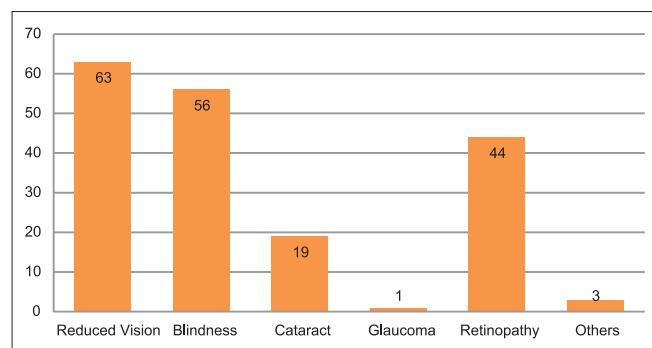


Figure 6: Awareness regarding the type of eye damage

40 (20%) knew that ocular involvement in diabetes was related to duration of diabetes, 42 (21%) felt that lack of blood sugar control was a risk factor for the development of DR.

Awareness regarding other risk factors was as follows- obesity (11.5%), hypertension (9.5%), smoking (4.5%), and high cholesterol (5.5%).

Nearly 77 (38.5%) patients knew that DR was treatable, and Table 3 shows details regarding knowledge of treatment options. 27 (13.5%) knew regarding laser, 9 (4.5%) knew

regarding surgery, 18 (9%) (Figure 3) knew regarding good control of diabetes, and 23 (11.5%) knew about drugs and injections into the eye (Figure 9).

The predictor variables which could have an effect on knowledge of retinopathy is treatable were studied. The predictor variables which were important were found by working out the Odd's ratios (OR) of the predictors on the likelihood of knowledge of retinopathy was literacy status, socio-economic strata, duration of DM, knowledge of treatment (Figure 7). It was finally observed that the literates had a lesser risk of acquiring DR (1.2 times lesser than the illiterates) with a significant $P < 0.001$. The per capita income did not have a reasonable effect on the outcome of DR. The knowledge in those with a longer duration of DM posed an increased risk with an OR of 3.76 and a definite statistically significant value of < 0.01 . 72% had knowledge of risk factors while 28% did not; the difference here was statistically significant.

It was also noted that in patients who had history of hypertension, the knowledge of DR was high (26% of population with a $P < 0.001$) (Figure 8).

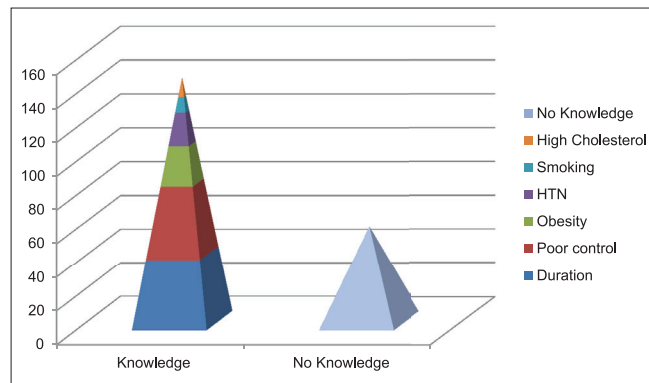


Figure 7: Awareness regarding the risk factors

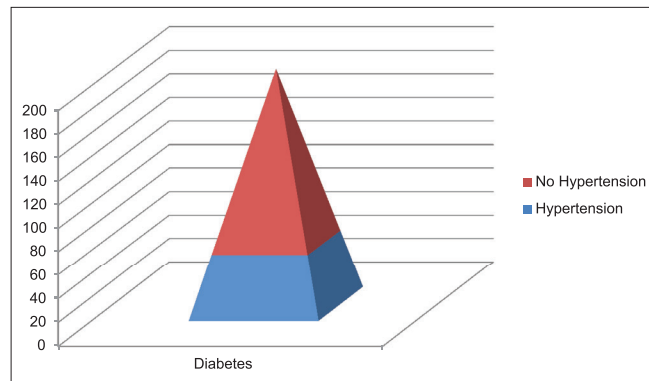


Figure 8: Hypertension and diabetes mellitus

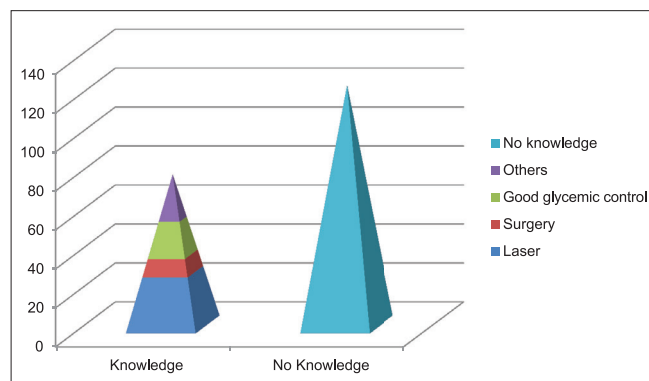


Figure 9: Treatment options for diabetic retinopathy

DISCUSSION

Various studies have shown that occurrence and severity of DR are related to duration of DM.⁵ Progression of DR and sight-threatening complications can be minimized if the diabetics are aware of ocular complications and come for regular ocular examination.

Dandona *et al.*⁶ have done a study in urban general population in India and have found low level of awareness (28.2%). Our study was done in rural population DM to awareness.

Table 2: Knowledge of risk factors of DR

Risk Factors	No.	%
Duration of DM	40	20
Lack of Blood Sugar control	42	21
Obesity	23	11.5
Hypertension	19	9.5
Smoking	9	4.5
High Cholesterol	11	5.5

Table 3: Knowledge of Treatment Options

Treatment Options	No.	%
Laser	27	13.5
Surgery	9	4.5
Control of Blood sugar	18	9
Drugs and Injections	23	11.5

CONCLUSION

Our study helps in identifying the lacunae of awareness in the present rural diabetic population and hence insists on more awareness camps to educate the patients regarding DR its risk factors management options and lifelong follow-up.

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Morphology and Morphometry of Mental Foramen in Dry Adult South Indian Mandibles: A Cross-Sectional Study

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Abstract

Introduction: Knowledge on the mental foramen would be helpful for the dental surgeons while performing various dental procedures. To prevent damage to the mental nerve while performing dental implants, root canal treatments, and orthodontic surgeries.

Materials and Methods: 50 dry adult human mandibles of unknown age and sex.

Results: Mean horizontal, vertical diameters were recorded, and bilateral symmetry was observed. Distance from the symphysis menti and distance from the inferior border were recorded, and there was no significant difference between the right and left sides.

Conclusion: The various parameters as taken in the present study helps the clinician to locate the foramen as there is no proper anatomical landmark for its isolation in mental nerve block and also while performing various dental and surgical procedures.

Key words: Mandible, Mental Foramen, Morphometry

INTRODUCTION

Mental foramen (MF) is an important anatomical landmark to facilitate surgical, local anesthetic, and other invasive procedures for dental surgeons performing periapical surgery in the mental region of the mandible. The MF, from which the mental nerve and vessels emerge, lies below either the interval between the premolar teeth or below the second premolar tooth. MF gives passage to mental nerve, mental artery, and vein. Mental nerve is a branch of inferior alveolar nerve which in turn is a branch of the mandibular nerve. It supplies chin, labial gingiva of lower teeth. The mental artery is a branch of inferior alveolar artery and a branch of maxillary artery. It supplies the chin lower teeth and gingiva. Mental vein, which drains into facial vein, is a part of pterygoid venous plexus.¹

Knowledge on the variations in the position, shape, and the size of the MF would be of much use for dental surgeons while they do surgical procedures on the mandible such as the curettage of the premolars, dental implants, root canal treatments, and orthognathic surgeries.² This study unlike most other studies is done on dry specimens which is no way harmful like the radiographs, which are generally used for morphometric studies. The study is carried out in south Indian population where not much of such knowledge is available.

MATERIALS AND METHODS

This study was performed on 50 dry mandibles collected from department of anatomy. All the mandibles are of unknown sex from South India. Mandibles, which are in a good condition, are included. Broken mandibles and mandibles with resorption at MF were excluded. Digital vernier calipers were used to measure the different parameters. Shape and direction of opening were observed and noted. The following parameters were measured: Horizontal diameter (HD), vertical diameter (VD), distance from symphysis menti (DSM), distance from inferior

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border (DIB) of mandible, and distance between the two foramina (DBF) (Figures 1-4).

OBSERVATION AND RESULT

The average HD was observed to be 2.95 mm; average VD was observed to be 2.23 mm; DSM was found to be 26.30 mm; DIB of mandible was found to be 13.05 mm; the average DBF was found to be 44.55 mm. Student's *t*-test was conducted and $P < 0.05$ was found to be significant (Table 1).

The direction of opening was observed to be posterior superior in 88.57%, superior in 5.71%, anterior superior 4.2%, and anterior inferior in 1.42% of the foramina. The shape of opening was observed to be oval in 70% and round in 30% of foramina. The foramina were found to be oval on both the sides in 20 mandibles; round on both the sides in 6 mandibles and oval on one side, round on another side in 9 mandibles. Accessory mental foramina

were found in 20% of mandibles on the left side and 2.8% of mandibles on both the sides (Table 2).

DISCUSSION

The present study showed that the MF is oval in shape in 70% of foramina and round in 30% of foramina. The results are similar to study of Olivera Junior *et al.*³ It is contrary to the study of Agarwal *et al.* in dry mandibles of Gujarat population which showed 92% oval foramina and 8% round foramina.⁴ The opening of foramen according to present study is posterior superior in majority of mandibles in agreement to results of Udhaya *et al.* and Agarwal *et al.*^{2,5}

Mean HD according to the present study is 3.04 mm on the right side and 2.86 mm on the left side, which was in contrary to studies by Udhaya *et al.* (2.28 mm on right and 2.95 mm on left). The mean HD is nearer to values found in a study by Dipti A Nimje *et al.* (3.11 on the right side), whereas a contrary was found on the left side (3.18 mm).^{2,6}



Figure 1: Horizontal diameter



Figure 3: Distance from symphysis menti



Figure 2: Vertical diameter



Figure 4: Distance from inferior border of mandible

Table 1: The mean and standard deviation of different parameters

Parameters	Right	Left	P value
HD	3.04±1.05	2.86±0.94	0.45
VD	2.31±0.47	2.19±0.40	0.24
DSM	25.9±1.71	26.7±1.87	0.06
DIB	13.2±1.56	12.9±1.61	0.44

HD: Horizontal diameter, VD, Vertical diameter, DSM: Distance from symphysis menti, DIB: Distance from inferior border

Table 2: The direction of opening on two sides

Shape	Right (%)	Left (%)
Oval	25 (71.42)	24 (68.57)
Round	10 (28.57)	11 (31.42)

Table 3: Mean values of different parameters in different populations (in mm)

Author	HD		VD		DIB		DSM	
	Right	Left	Right	Left	Right	Left	Right	Left
Dipti A Nimje (11)	3.11	3.18	2.53	2.56	12.39	12.27	25.81	25.81
Olivera Junior (6)	3.32	3.25	2.38	2.39	12.95	12.96	-	-
Agarwal (9)	3.33	3.25	2.15	2.13	12.16	12.11	25.55	25.05
Udhaya (8)	2.28	2.95	2.86	2.52	12.77	12.65	25.29	25.79
Rahul Rai (13)	2.63	2.61	2.33	2.29	12.43	12.17	22.41	22.23
H S Shaik (12)	12.40	12.3.19	2.50	2.50	12.40	12.21	26.62	26.40

HD: Horizontal diameter, VD, Vertical diameter, DSM: Distance from symphysis menti, DIB: Distance from inferior border

Mean VD in the present study is 2.31 mm on the right side and 2.19 on the left side. These values are near to the study by Olivera Junior (2.38 mm and 2.39 mm on right and left, respectively).³

DSM is found to be 25.90 mm on the right side and 26.7 mm on the left side. Studies by Hussain Saheb

Shaik *et al.* showed DSM is found to be at a distance of 26.62 mm on right and 26.40 mm on the left side of the mandible. Contrary to this is seen in studies by Rahul Rai, who observed that it is only 22.41 mm on the right side and 22.23 on the left side.^{6,7} DIB of mandible as observed in the present study is 13.19 mm on right and 12.90 mm on the left. These are nearer to values found by Olivera Junior *et al.* (12.95 mm on right and 12.96 mm on left).³ Comparison of the data of the present study with other authors is presented in Table 3.

CONCLUSION

The presence of mental neurovascular bundle in the MF makes it necessary to isolate the foramen in the above-mentioned clinical procedures. Hence, establishing a safety zone in this region becomes necessary. The various parameters as taken in the present study help the clinician to locate the foramen as there is no proper anatomical landmark for its isolation.

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Role of Electrodiagnostic Nerve Conduction Studies in the Early Diagnosis of Diabetic Neuropathy: A Case-Control Study

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Abstract

Background: The complications of diabetic neuropathy lead to diabetic foot, ulceration, amputation, and loss of ambulation. It is better to prevent the complications by the early diagnosis of onset of diabetic neuropathy and start treatment. The present study was undertaken to find out the right parameter in early intervention of diabetic neuropathy.

Materials and Methods: Nerve conduction studies were performed on median, ulnar, tibial, common peroneal and sural nerves bilaterally in 60 subjects (30 diabetic and 30 non-diabetic). Motor nerve conduction velocity, motor amplitude, sensory conduction velocity and sensory amplitudes were measured and recorded. The data were processed in student t test and analysis of variance.

Results: Significant difference was observed between the diabetic and non-diabetic groups for all the nerves. Lower limb nerves are affected more than the upper limb nerves, and the sensory nerves are severely affected than the motor nerves. A negative correlation was observed between the duration of diabetes and nerve conduction studies.

Conclusion: Nerve conduction studies can be employed in the routine examination of diabetes mellitus for the early intervention of diabetic neuropathy. Lower limb sensory nerves were the good choice in early diagnosis as the lower limb nerves are affected severely compared to upper limb nerves and the sensory are affected more than motor nerves.

Key words: Diabetes mellitus, Diabetic neuropathy, Nerve conduction velocity

INTRODUCTION

Diabetes mellitus is the most common endocrine disorder which is characterized by metabolic abnormalities and in the long run with micro and macrovascular complications that cause significant morbidity and mortality.^{1,2} India has the second highest diabetes prevalence in the world as India is one of the rapidly developing country and the rapid urbanization has brought along with it a sedentary lifestyle, which is an important contributor for diabetes.³ Diabetic neuropathy is a common complication of diabetes mellitus with severe morbidity, compromising

the quality of life. An intensive treatment of neuropathy at the subclinical level decreases the risk of neuropathy.⁴ The American Academy of Neurology recommends at least one of the five criteria for screening and diagnosing diabetic neuropathy: Symptoms, signs, electro diagnostic tests, quantitative sensory tests and autonomic testing.⁵

Screening and diagnostic testing of diabetic neuropathy are very much essential to prevent the complications associated with it such as diabetic ulceration followed by amputation. The present study was undertaken to find out the use of nerve conduction studies in the diagnosis of diabetic neuropathy. In this study, we would like to compare nerve conduction of the upper limb nerves with the lower limb nerves and also would like to know which nerve is severely affected.

MATERIALS AND METHODS

The present study was a case-control study carried out in the department of physiology, Government Medical

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College, Nizamabad in collaboration with Krishna institute of medical sciences, Hyderabad. The room temperature was set to 24°C. The study was conducted on 60 Participants in the following groups: 30 subjects with diabetic neuropathy (15 men and 15 women) and 30 nondiabetic subjects (15 men and 15 women). All the research participants were between the age group of 40 to 60 years. The mean duration of diabetes mellitus was 21.02 ± 17.65 years. All the subjects were recruited after informed consent was taken. Institutional ethical clearance was obtained to carry out the study. The diabetic subjects without any other associated medical conditions were included in the study. The diabetic subjects with other concomitant diseases which may affect nerve conduction were excluded from the study. The present study was a non-invasive method of estimation of nerve conduction using electromyography/evoked potential system (Nicolet/systems - USA make). The surface electrodes are surface stimulates with an automatic computerized monitor with printer attached. For assessing the degree of neuropathy and comparing with normale following parameters were recorded. The motor conduction velocity, motor amplitude, sensory conduction velocity and sensory amplitude were measured and recorded. All the measurements were recorded in median, ulnar, tibial, common peroneal and sural nerves bilaterally in cases and controls.

Statistical Analysis

Data are presented as mean \pm SD. Results of the nerve conduction studies were evaluated by unpaired *t*-test, and regression analysis along with analysis of variance (ANOVA) with duration of diabetes as independent variable and other parameters as dependent variables. A level of $P < 0.05$ was accepted as statistically significant.

RESULTS

The mean values of all the parameters of diabetic group were very low in all the four nerves when compared with control or non-diabetic group. The values are depicted in Tables 1-4.

Motor nerve conduction velocities and motor amplitudes in median, ulnar, common peroneal and tibial nerves were significantly lower in the diabetic group than in nondiabetic healthy group ($P < 0.05$; Figures 1 and 2). The lower limb nerves were affected significantly higher than the upper limb nerves. A significant difference was observed between the nerves of the upper limb and lower limb.

Sensory velocities and sensory amplitudes in median, ulnar and sural nerves were significantly lower in the diabetic

group than in non-diabetic healthy group ($P < 0.05$; Figures 3 and 4). The sensory velocities and sensory amplitudes of lower limb nerves (sural nerve) were significantly lower than the upper limb nerves.

Table 1: The mean, standard deviation, *t* and *P* values of median nerve

Parameter	Diabetic	Non-diabetic	<i>t</i> -value	<i>P</i> -value
Motor velocity	49.4 \pm 10.1	59.9 \pm 4.03	6.11	0.0001
Motor amplitude	7.80 \pm 2.94	9.96 \pm 1.74	4.01	0.0001
Sensory velocity	41.9 \pm 22.1	57.3 \pm 5.57	4.29	0.0001
Sensory amplitude	18.6 \pm 16.5	47.3 \pm 21.5	6.70	0.0001

Table 2: The mean, standard deviation, *t* and *P* values of ulnar nerve

Parameters	Diabetic	Non-diabetic	<i>t</i> -value	<i>P</i> -value
Motor velocity	49.5 \pm 12.8	59.8 \pm 4.42	4.84	0.0001
Motor amplitude	7.65 \pm 3.17	11.3 \pm 2.28	5.95	0.0001
Sensory velocity	36.0 \pm 19.2	56.4 \pm 4.96	6.49	0.0001
Sensory amplitude	17.2 \pm 14.4	46.0 \pm 18.6	7.75	0.0001

Table 3: The mean, standard deviation *t* and *P* values of common peroneal nerve

Parameters	Diabetic	Non-diabetic	<i>t</i> -value	<i>P</i> -value
Motor velocity	36.9 \pm 16.6	50.8 \pm 3.13	5.22	0.0001
Motor amplitude	3.35 \pm 3.31	6.00 \pm 1.80	4.45	0.0001

Table 4: The mean, standard deviation, *t* and *P* values of tibial nerve

Parameters	Diabetic	Non-diabetic	<i>t</i> -value	<i>P</i> -value
Motor velocity	38.5 \pm 14.3	31.3 \pm 18.8	1.90	0.061
Motor amplitude	6.89 \pm 5.18	8.30 \pm 5.73	1.13	0.26

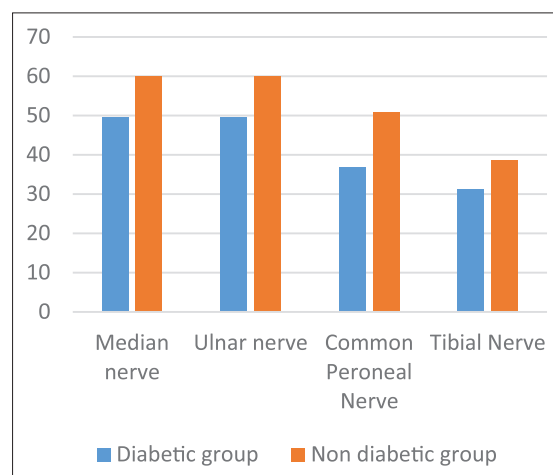


Figure 1: Bar diagram showing the motor nerve conduction velocities in diabetic and non-diabetic groups

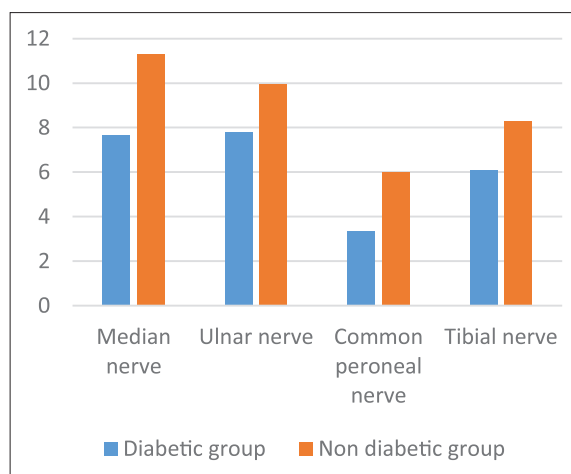


Figure 2: Bar diagram showing the motor amplitudes in diabetic and non-diabetic groups

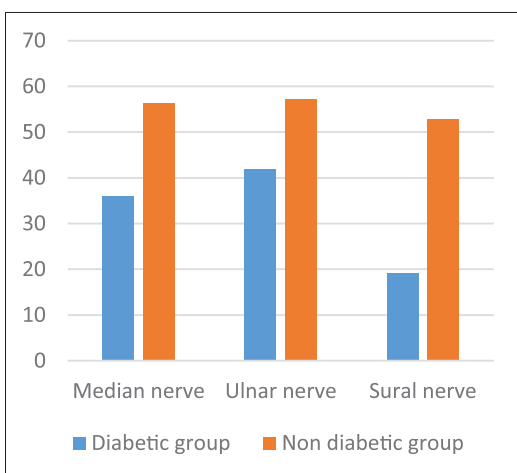


Figure 3: Bar diagram showing the sensory nerve conduction velocities in diabetic and non-diabetic groups

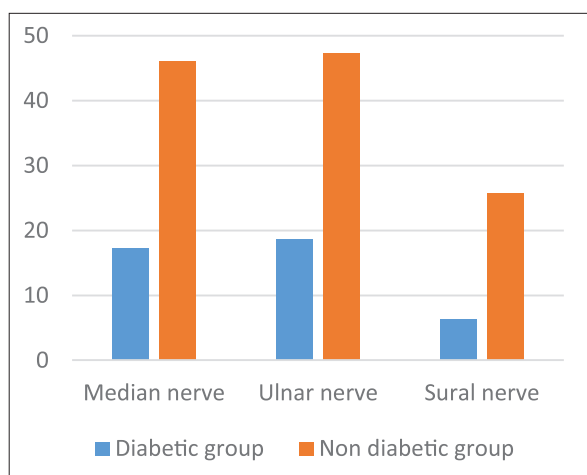


Figure 4: Bar diagram showing the sensory amplitudes in diabetic and non-diabetic groups

Regression analysis along with ANOVA was performed. Duration of diabetes was considered as independent

variable and other parameters (motor velocity, motor amplitude, sensory velocity and sensory amplitude) as dependent variables. Significant correlation was not found between the duration of diabetes mellitus and the nerve conduction velocities and amplitudes.

DISCUSSION

Early detection of neuropathy in the asymptomatic stages is very important as the disease process progresses to the diabetic foot which is a highly morbid condition that arises from the infection and the ulceration of foot, finally leading to amputation.⁶ Diabetic neuropathy can be diagnosed in subclinical level by using electrophysiological techniques. Impairment of sensory motor axons and the myelin sheath at the distal end already exists in the early stages of diabetic peripheral neuropathy, before symptoms arise.⁷ The slowing of nerve conduction velocities indicates the on-going damage to the myelinated sheaths and the amplitude decrease with the axonal loss which indicates rising HbA1c levels.⁸ Sensory nerves were affected to a great extent than the motor nerves, indicating that the sensory nerves are more vulnerable to damage than motor nerves in diabetic peripheral neuropathy. Diabetic group extent of nerve fiber lesions in the lower extremities is more severe than that in the upper extremities.⁷

In this study, we compared motor nerve conduction velocities, amplitudes of ulnar, median, common peroneal, tibial nerves and sensory conduction velocities, amplitudes of median, ulnar and sural nerves. The sensory components of sural nerve were more affected than ulnar and median nerves. The motor components of common peroneal and tibial were affected more than the median and ulnar nerves. The present study results were similar with Kakrani *et al.*, they performed nerve conduction study on 50 patients of diabetic neuropathy out of which all patients, i.e., 100% had involvement of lower limb and only 24 patients, i.e., 48% had involvement of upper limb. They performed nerve conduction study in tibial, sural, medial plantar and lateral plantar nerves in the lower limb and median and ulnar nerve in upper limb and found that the involvement of tibial and sural nerve was more common than the other nerves. Isolated involvement of sural nerve percentage was higher and isolated involvement of upper limb nerves were not found.⁶ Killian and Foreman, Turgut *et al.*, and Leventoglu *et al.*, concluded that the dorsal sural nerve conduction study can evaluate the most distal segments of the extremities and can be considered an alternative method for the diagnosis of polyneuropathy in the early stages of diabetes mellitus.^{7,9,10}

CONCLUSION

Lower limb nerves are affected more than the upper limb nerves. Sensory nerve conduction values of sural nerve were significantly lower than the ulnar and median nerves. Nerve conduction tests on the sural nerve may help the physicians to detect the diabetic neuropathy in the early stage. Nerve conduction tests should be routinely examined in diabetic patients for early detection of diabetic neuropathy and prevention of the complications. Further studies can be carried out with larger sample size and matching age groups in cases and controls.^{11,12}

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Role of Ultrasonography and Color Doppler to Diagnosis of Pelvic Masses and its Correlation with Histopathological Findings

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Abstract

Background: Pelvic masses are quite common presentation of gynecological pathology. Ultrasonography (USG) is accepted as the primary imaging modality in the evaluation of pelvic masses, and provides the necessary information to plan out the right therapeutic approach required in the given situation. This study was conducted with a view to find out the diagnostic value of USG, color Doppler study, and correlate with histopathological diagnosis.

Objectives: To study the ultrasonographic and color Doppler findings of pelvic masses, and compare its relative efficacies with histopathological diagnosis.

Materials and Methods: A total of 50 patients were taken in the study referred from various departments. B-mode morphological criteria were used and subsequently spectral Doppler analysis was done by calculating resistive index (RI) and pulsatility index (PI) values. USG was performed by GE LOGIC P6 USG and GE-VIVID-E machine. International ovarian tumor analysis (IOTA) scoring system, RI and PI value was applied to differentiate benign and malignant pelvic masses.

Results: Studied 50 cases, benign and malignant lesions were found in patients belongs to 30-50 and 50-70 years, respectively. Out of 50 cases, 47 cases (94%) were confirmed by histopathology. USG showed an overall sensitivity of 94% and specificity of 90% in comparison to the histopathological findings. For ovarian lesions, USG using IOTA scoring system showed 98% sensitivity and 94% specificity in comparison to the histopathological findings.

Conclusion: USG is a very useful, highly diagnostic and a reliable method in the diagnosis of pelvic masses with good sensitivity and specificity.

Key words: Color Doppler, International ovarian tumor analysis, Pelvic masses, Spectral Doppler, Ultrasonography

INTRODUCTION

Pelvic masses are quite common presentation of a gynecological pathology. Differential diagnosis of pelvic masses is difficult and complex. Although the most of the pelvic masses are benign, they are associated with significant morbidity and are the most common indication for surgery. It is the risk of malignancy that propels us for

early, accurate and prompt diagnosis to lessen the mortality and morbidity.

Of all gynecological diseases, tumors of the adnexa pose one of the most difficult diagnostic puzzles. It is of great importance to differentiate these lesions and to characterize them. Lesions of ovarian origin form majority of the bulk of the adnexal masses; the management of ovarian tumors remains a common clinical gynecologic problem. The early and definitive diagnosis of ovarian malignancy is of grave clinical importance. Ultrasonography (USG) is accepted as the primary imaging modality in the evaluation of pelvic masses.

Sonography usually provides clinically important parameters for the evaluation of pelvic masses. Pelvic sonography can

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confirm the presence or absence of a suspected pelvic mass.¹

The diagnosis of ovarian tumors is based on clinical examination, sonography, and measurements of CA-125 collectively known as triple diagnostic method.² Ovarian cancer is the most common cause of death from gynecological malignancy, and is the fifth most common cause of cancer deaths in women.³

The advent and use of diagnostic ultrasound changed the spectrum of the diagnostic approach to pelvic masses. Pelvic ultrasound today forms the primary examination mode in the evaluation of pelvic masses. It provides the gynecologist the necessary information to plan out the right therapeutic approach required in the given situation. Hence, ultrasound has become a mandatory examination in the approach to the management of pelvic masses. This study was conducted with a view to find out the diagnostic value of USG and its correlation with the clinical and histological diagnosis.

Color and pulsed Doppler has been introduced to improve the diagnostic accuracy. Early works and initial reports were encouraging with a very impressive accuracy, but today's literature is full of conflicting results with reduction of the previously promising diagnostic accuracy.

MATERIALS AND METHODS

This study was conducted in Department of Radiodiagnosis, Sukh Sagar Medical College and Hospital, Mukanwara, Jabalpur, Madhya Pradesh. 50 patients were taken in the study with informed consent, referred from gynecology and another department. Relevant investigations were done according to their clinical findings. Using a 3-5 MHz Convex Array Transducer through a transabdominal (TAB) approach, B-mode USG, color Doppler, and spectral Doppler were performed. Transvaginal sonography was also performed using 8-10 MHz Vaginal Transducer. B-mode morphological criteria were used for our study. Subsequently, color and pulsed Doppler imaging was performed. Flow results were recorded as being absent or present and further as normal or abnormal. Vessel location arrangement and morphology were noted. Spectral Doppler analysis was performed by calculating resistive index (RI) and pulsatility index (PI) values, and the lowest values recorded in the masses are noted.

RI ≤ 0.4 and PI ≤ 1.0 were taken as cutoff for ovarian malignancy.

Inclusion Criteria

1. Female patients prepubertal to post-menopausal of all age group presenting with symptoms such as pain in abdomen/pelvis, PV bleeding, PV white discharge, urinary and gastrointestinal pressure symptoms and palpable mass.
2. Furthermore, asymptomatic patients where pelvic mass detected at time of routine pelvic examination or at the time of USG transabdominal (TAB) and transvaginal sonography done for other diagnoses.

Criteria for Exclusion

1. Patients with ovulation induction drugs
2. Patients who will not undergo fine needle aspiration cytology or histopathological evaluation
3. Those patients who will be lost in follow-up
4. Patients with ectopic pregnancy are excluded
5. Patients with normal pregnancy.

All of them were subjected to TAB USG with full bladder technique with 3.5 MHz probe and if required then transvaginal sonography with empty bladder technique with 6.5 MHz except for the unmarried female patients. TAB and transvaginal USG were performed with the use of diagnostics GE LOGIC P6 USG and GE-VIVID-E ultrasound system. Observations included size, shape, and echo texture of the pelvic masses in sagittal and transverse planes. International ovarian tumor analysis (IOTA) scoring system was applied to differentiate benign and malignant ovarian tumors.

Statistical Analysis

A statistical analysis was performed using SPSS software, version 20.0 (SPSS, Inc., USA). The Chi-squared test and independent sample *t*-test were used to compare categorical and continuous variables, respectively. Data were presented as a mean \pm standard deviation or proportion as appropriate. The $P < 0.05$ was considered to be significant.

RESULTS

About 50 cases of pelvic masses were evaluated and found that benign lesions were seen in patients between 3rd and 5th decades, whereas malignant lesions were usually found in patients between 5th and 7th decades (Table 1 and Chart 1). The majority of the lesions were ovarian in origin 46%, followed by uterine origin 32% and cervix 8% and endometrial cavity 8%, pelvic abscess 4%, and fallopian tube 2% (Tables 2,3 and Chart 2). Out of 50 cases, 47 cases (94%) were confirmed by histopathology in following manner fibroid (24%), adenomyosis (08%), endometrial Ca (06%), Ca cervix (08%), vesicular mole (02%), ovarian dermoid (08%), mucinous cystadenoma (02%), serous

cystadenoma (12%), serous cystadenocarcinoma (08%), mucinous cystadenocarcinoma (06%), dysgerminoma (02%), fibrothecoma (02%), granulosa cell tumor of ovary (02%), and abscess (04%) (Table 4 and Chart 3). Overall, 23 (46%) cases of ovarian lesion 11 cases (52.38%) are benign, shows normal color flow pattern with RI more than 0.4, and PI more than >1.00 and 10 cases (47.62%) are malignant shows abnormal color flow pattern with RI <0.4 and PI <1.0 (Tables 5-8). Vessels location of ovarian masses was also detected by the color Doppler and out of 21 ovarian masses 9 shows peripheral vessel location, 03 shows septal location, 04 shows septal + central, 03 shows peripheral + septal, and 02 shows peripheral + septal vessel location. Central and septal vascularity was found in 65% of the malignant masses, whereas peripheral vascularity was present in 25% of the cases (Table 9 and Chart 4). Overall in our study, USG showed a sensitivity

of 94% and specificity of 90% for pelvic masses and 98% sensitivity and 94% specificity ovarian lesions (Figures 1-5).

DISCUSSION

A total of 50 patients who presented with pelvic mass were part of this study spread over a period of 1 year. Out of 50 cases, 3 cases were wrongly diagnosed on USG. Ultrasound diagnosis in all the patients is confirmed either

Table 1: Age wise incidence

Age group (years)	Number of cases (%)
10-20	03 (06)
21-30	09 (18)
31-40	10 (20)
41-50	12 (24)
51-60	09 (18)
61-70	07 (14)
Total	50 (100)

Table 2: USG site of lesion

USG site of lesion	Number of cases (%)
Uterus	16 (32)
Cervix	04 (08)
Endometrial cavity	04 (08)
Right ovary	06 (12)
Left ovary	05 (10)
Bilateral ovaries	06 (12)
Right adnexa	04 (08)
Left adnexa	02 (04)
Pelvic abscess	02 (04)
Fallopian tube	01 (02)
Total	50 (100)

Table 3: USG diagnosis

USG diagnosis	Number of cases (%)
Fibroid	13 (26)
Adenomyosis	03 (06)
Endometrial Ca	03 (06)
Ca cervix	4 (08)
Vesicular mole	1 (02)
Hydrosalpinx	1 (02)
Ovarian torsion	2 (04)
Ovarian lesions	21 (42)
Pelvic abscess	2 (04)
Total	50 (100)

USG: Ultrasonography

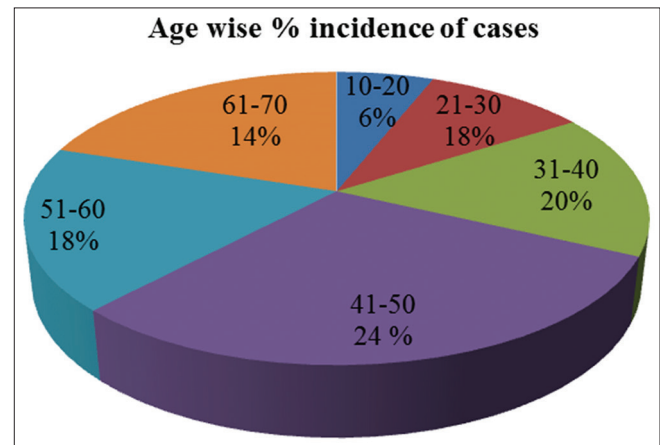


Chart 1: Chart showing age wise frequencies of pelvic masses

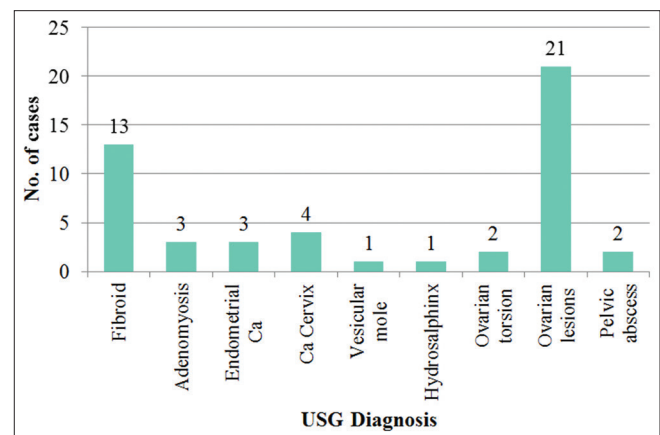


Chart 2: Ultrasonography diagnosis

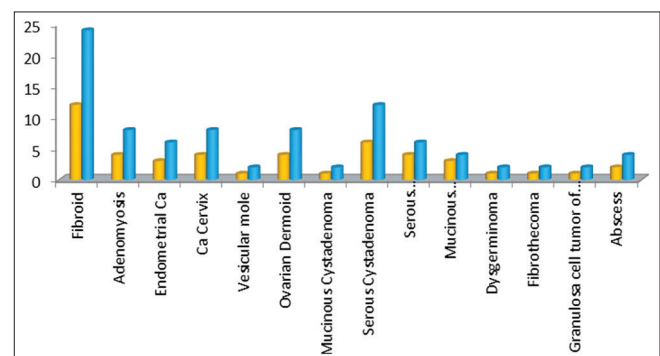


Chart 3: Histopathological diagnosis

Table 4: Histopathological diagnosis

Histopathological diagnosis	Number of cases (%)
Fibroid	12 (24)
Adenomyosis	04 (08)
Endometrial Ca	03 (06)
Ca Cervix	04 (08)
Vesicular mole	01 (02)
Ovarian Dermoid	04 (08)
Mucinous Cystadenoma	01 (02)
Serous Cystadenoma	06 (12)
Serous Cystadenocarcinoma	04 (08)
Mucinous Cystadenocarcinoma	03 (06)
Dysgerminoma	01 (02)
Fibrothecoma	01 (02)
Granulosa cell tumor of ovary	01 (02)
Abscess	02 (04)
Total	47 (94)

Table 5: Malignancy positive ovarian lesions after histopathology

Ovarian lesions	Number of cases (%)	P value
Malignancy negative	11 (52.38)	<0.05
Malignancy positive	10 (47.62)	<0.05
Total	21 (100)	

Table 6: Cases diagnosed on USG proved by histopathology

USG diagnosis	Number of cases (%)
Correct/equivocal	47 (94)
Wrong	03 (06)
Total	50 (100)

USG: Ultrasonography

Table 7: Doppler flow study

Total number	21	P value
Normal flow	11	<0.05
Abnormal flow	10	<0.05

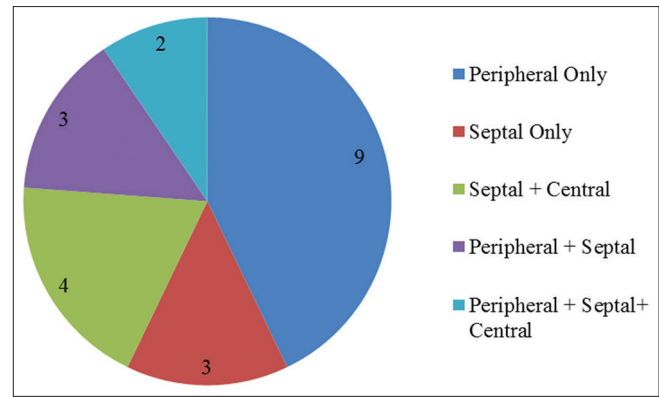
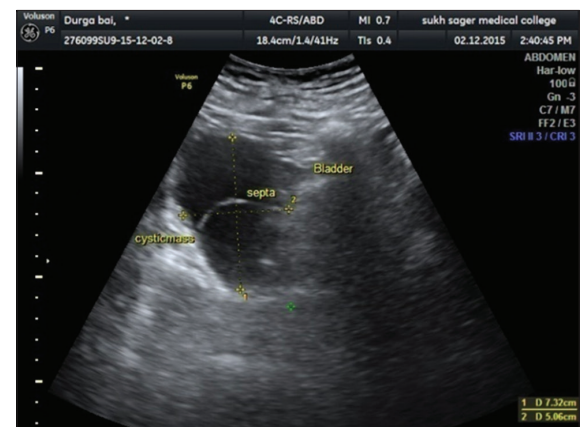
Table 8: Spectral Doppler indices

RI and PI	Total	P value
RI < 0.40 and PI < 1.00	10	<0.05
RI > 0.40 and PI > 1.00	11	<0.05

RI: Resistive index, PI: Pulsatility index

Table 9: Vessel location

Vascularity	Total
Peripheral only	09
Septal only	03
Septal+central	04
Peripheral+septal	03
Peripheral+septal+central	02

**Chart 4: Vessel location****Figure 1: B/L ovarian cyst****Figure 2: Right ovarian serous cystadenoma**

on histopathology, post-operative findings or on follow-up ultrasound scans. USG showed a sensitivity of 94% and specificity of 90% in comparison to the histopathological findings. In our study, the majority of cases 24% were in the age group of 41-50 years. The majority of cases 46% were arising from ovary and 32% from uterus, 8% were cervical lesions, 8% originated in the endometrial cavity and 4% were pelvic abscess and 2% from the fallopian tube. In

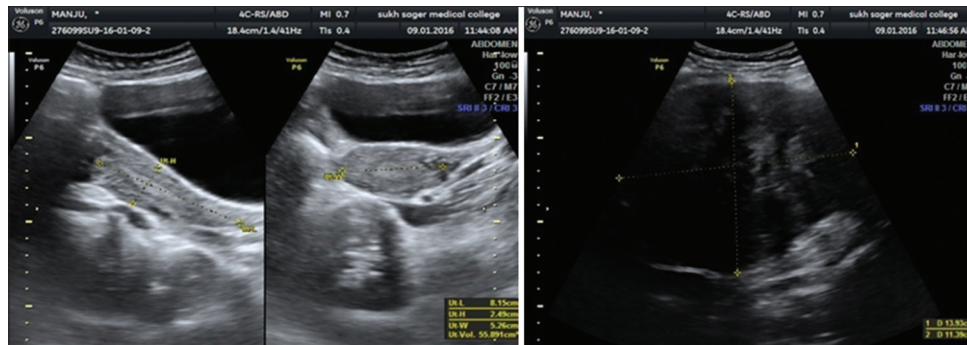


Figure 3: Large pedunculated uterine fibroid (arising from fundus)

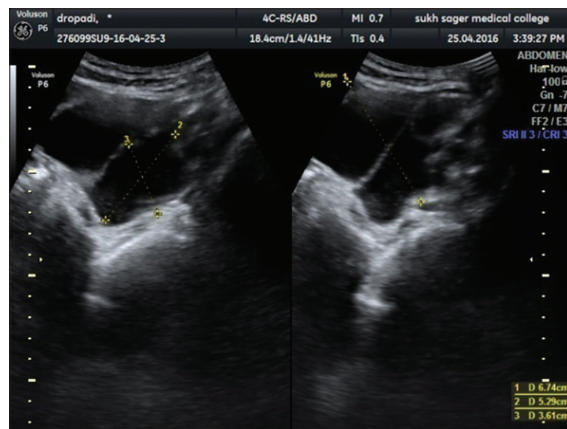


Figure 4: Right ovarian mucinous cystadenoma

our study, majority of the cases were uterine fibroid 24%. In our study, ultrasound in fibroid had a sensitivity of 94% and a specificity of 90%. Out of total 13 cases of fibroid, 10 cases were of intramural 2 cases were of subserosal and 1 case was of submucosal fibroid. 1 case is wrongly diagnosed as an intramural fibroid, which turned out to be adenomyosis of uterus on histopathology.

Evaluation of Ovarian Masses

The pre-operative imaging characterization of an ovarian mass directly affects surgical decisions and subspecialty referral and is, therefore, important for patient treatment.

Sonomorphology

While evaluating the usefulness of gray scale morphology for differentiation of malignant from benign masses Stein *et al.*⁴ found a sensitivity of 98%, specificity of 62%, negative predictive value (NPV) of 99% and positive predictive value (PPV) of 50%. Buy *et al.*⁵ using similar technique reported a sensitivity of 88% and specificity of 82%. Timor Trisch *et al.*⁶ with the help of morphologic scoring system yielded a sensitivity of 94%, specificity of 87%, and a PPV of 60%. Madan *et al.*⁷ reported a sensitivity of 92.5% using sonomorphology.

We in our study used a morphological scoring system as used by Kurjak *et al.*,⁸ while evaluating ovarian masses

by B-mode USG. In our study, the ovarian masses were evaluated on the basis of locularity, nature of fluid, inner margin of mass, papillary growth, solid area, presence of peritoneal fluid, and whether the mass is unilateral or bilateral. Each such characteristic was assigned a particular scoring. On the basis of such cumulative scoring, the masses were classified as definitely benign (score <2), equivocal (score 3 and 4), and suspicious (score >5).

In using the aforesaid morphological scoring system, we obtained a sensitivity of 85% and specificity of 53.33% although the PPV was low at 54.83%, NPV was high at 84.21%. The sensitivity and specificity of our study correlated well with that of Stein *et al.*⁴ and Madan *et al.*⁷

Sensitivity of our study also matched well with that of Buy *et al.*⁵ and Timor Trisch *et al.*⁶ However our study show much lower specificity, although the NPV corroborated well with aforesaid studies.

Presence of Vascularity

Most of the recent studies using color Doppler have succeeded in demonstrating blood flow within the ovarian masses. In our study, vascularization was observed in 66% of the benign masses and 90% of the malignant masses.

Our study which corroborated well with that of Taori *et al.*⁹ which shows presence of vascularity in benign tumors 42.24%, malignant 92.59%.

In our study, the presence of flow showed a sensitivity of 90% and specificity of 33.33%, PPV of 47.36%, and NPV of 83.33%. These observations corroborated well with the findings of Stein *et al.*⁴ who reported a sensitivity of 77% and specificity of 69%, PPV of 49%, and NPV of 89% and PPV of 49% for the presence of flow within the ovarian masses.

Vessel Location

Vessels location was classified according to their location in the tumor as central, peripheral, and septal and combination of all the above. Central and septal vascularity was found

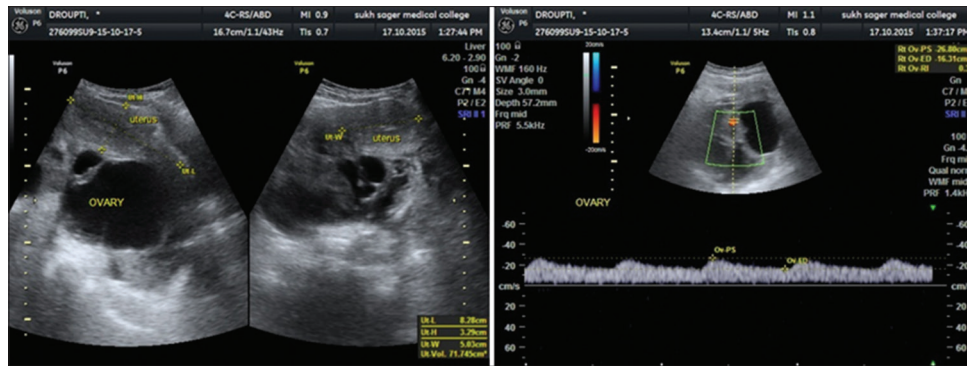


Figure 5: Right ovarian mucinous carcinoma (RI value: <0.4)

in 65% of the malignant masses, whereas peripheral vascularity was present in 25% of the cases. These findings correlate quite well with the findings of Taori *et al.*⁹ and Valentin.¹⁰

Doppler Indices

Pulsatility and RI

Pulsed Doppler vascular resistance to blood flow had been and still one of the major features in the assessment of tumor vascular characteristics. It is a fact that difference in vascularity exists and blood vessels in malignant adnexal lesions show lower resistance to blood flows than in benign adnexal mass. Different studies suggest different cut-off values. Carter *et al.*¹¹ and Taori *et al.*⁹ used pre-established cutoff criterion of PI <0.8 and RI <0.6 for malignant lesions. Although most other including Kurjak *et al.*⁸ and Buy *et al.*⁵ used the cutoff criterion of PI <1.0 and RI <0.4 for malignant lesions. In our study, we used the cutoff criterion of PI <1.0 and RI <0.4 for malignant lesions.

Madan *et al.*⁷ using 52 patients in his study found that peak systolic velocity (PSV) is a better discriminator of malignant versus benign ovarian masses, showing lesser degree of overlap as compared to resistive and pulsatility indices. We in our study did not use PSV as criteria in distinguishing malignant from benign masses. Our study included spectral indices of RI and PI which showed high sensitivity and specificity, whereas Madan *et al.*⁷ found a considerable overlap in values of these two spectral indices.

However, Buy *et al.*⁵ evaluated 115 patients with ovarian masses using spectral Doppler and with the use of RI ≤ 0.4 accuracy was 77%, sensitivity 18%, and specificity was 98%. For a PI ≤ 1.0 accuracy was 68%, sensitivity 71% and specificity was 67%. The authors were of the opinion that color and spectral Doppler USG yields important data regarding the nature of ovarian tumor before surgery. Our study while evaluating the role of color Doppler used similar Doppler indices as that of used by with RI cutoff value of <0.4 for diagnosing malignant masses showed the sensitivity of 55%, specificity of 3.33%, PPV

of 84.61% and NPV of 75.67%. PI with cutoff value of <1.0 resulted in a sensitivity of 90%, specificity of 63.33%, PPV of 62.06% and NPV of 90.47%. Thus, our study had a harmonious result with that of Buy *et al.*⁵

Guerriero *et al.*¹² performed a study on 826 complex ovarian mass. The authors opined that color and spectral Doppler was more accurate in the diagnosis of adnexal malignancies in comparison with gray scale sonography because of significantly higher specificity. The result of their study was validated by the study conducted in our institution.

Chou *et al.*¹³ used color Doppler USG to evaluate 114 adnexal masses before surgery. RI was used to determine the peripheral resistance of intratumoral vessels. The blood flow is considered normal when RI was >0.5 and abnormal when it was <0.5. The authors reached a conclusion that using color and spectral Doppler a very high sensitivity and NPV were obtained. Similar results were also obtained in our study.

Weiner *et al.*¹⁴ examined the impedance to blood flow by color flow imaging in 53 ovarian masses before exploratory laparotomy. The sensitivity and specificity of the pre-operative PI using a cutoff value of 1.0 in detecting malignant tumors were 94% and 97%, respectively. The authors opined that color flow imaging may be a useful clinical tool in the pre-operative evaluation of ovarian masses.

Pulsed and vascular resistance to blood flow had been and still one of the major features in the assessment of tumor vascular characteristics. It is a fact that difference in vascularity exists and blood vessels in malignant lesions show lower resistance to blood flow that in benign masses. Although the different authors suggest different cutoff values, we have found that levels of 0.40 and 1.0 for RI and PI, respectively, are the best discriminatory values for differentiation between benign and malignant ovarian masses. We believe that the major problem in observed overlap as reported by quite a few studies is due to variation of RI and PI results with the same tumor because of different areas of vascularization (pre-existing and newly

formed vessels) inside the tumor. There for in our opinion, optimal ovarian lesion characterization appears to be obtained through the combination of gray scale morphology and color Doppler flow imaging information. Thus, B mode USG in combination with color Doppler and spectral Doppler is proposed as the first and foremost diagnostic modality for the patients suspected with ovarian lesions. This will go a long way in establishing an early and definitive diagnosis of ovarian malignancy, thus having a profound effect on patient management.

CONCLUSION

In our study, USG showed an overall sensitivity of 94% and specificity of 90% in comparison to the histopathological findings. For ovarian lesions, USG using IOTA scoring system showed 98% sensitivity and 94% specificity in comparison to the histopathological findings. Hence, USG makes possible to establish the diagnosis quickly and thus start appropriate treatment early with reduction of false-positive findings and invasive procedures. In conclusion, sonography with a good equipment when appropriately performed by an experienced radiologist, using a proper methodology and standard guidelines has proved to be a very useful highly diagnostic and a reliable method with good sensitivity and specificity.

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Ultrasonographic Fetal Biometry in the Third Trimester in South Indian Population

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Abstract

Introduction: Knowledge of gestational age is useful in evaluating fetal growth because the normal range for the size of any fetal parameter changes with advancing age and it also allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy.

Materials and Methods: This study was conducted on 1000 normal third trimester pregnant women belonging to South Indian population. 50th percentile values of biparietal diameter, head circumference, abdominal circumference, and femur length were calculated in fetuses ranging from 31 to 40 weeks of the gestational age.

Results: A significant positive correlation was observed between the gestational age and all the parameters.

Conclusion: In all the pregnancies, the parameters taken are correlating with the gestational age and hence the ultrasound examination of parameters is a good guide to the age estimation of fetus.

Key words: Biparietal diameter, Femur length, Fetal biometry, Head circumference, Ultrasonography

INTRODUCTION

Ultrasonographic determination of fetal size to estimate the gestational age is very important in the present day obstetric practice as a significant proportion of pregnant women are unsure of their last menstrual period. Gestational age determination frequently relies solely on sonographic measurements of the fetal parts such as the biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), and femur length (FL). Many variables affect fetal growth such as maternal illness, drug exposure, genetic syndromes, congenital anomalies, placental insufficiency, and others. Previous reports have shown that ethnicity plays a role in fetal growth.¹

Thus, each ethnic group should have their own reference values for the different fetal biometric variables to provide

accurate assessments. It is useful to reduce unnecessary examinations due to wrongly diagnosed growth retardation in the cases with a small fetal growth potential. It also makes sense to improve the detection of objectively retarded children to a disproportionately high growth potential.²

Knowledge of gestational age is useful in evaluating fetal growth because the normal range for the size of any fetal parameter changes with advancing age and it also allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy. Hadlock values were commonly being used as reference charts in the ultrasound machine and most widely accepted for biometry measurements. However, literature suggests the ethnic variation in fetal biometry in relation to gestational age. This study was undertaken to give normal 50th percentile values of fetal biometry (biparietal diameter [BPD], FL, HC and AC) in 31-40 weeks gestational age of south Indian population.

MATERIALS AND METHODS

A study was designed to examine the relationships between fetal biometric parameters and gestational age;

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with a total of 1000 normal pregnant women in the last trimester of pregnancy. Biparietal diameter (Figure 1), head circumference (Figure 2), abdominal circumference (Figure 3) and femur length were measured and recorded in all the fetuses of pregnant women. The women with severe complications were not taken into consideration. All the ultrasonographic scans were performed by the sonographers under the supervision of single sinologist. A machine with curvilinear transabdominal transducers was used. In this study, 50th percentile values of BPD, HC, AC, and FL were calculated in fetuses ranging from 31 to 40 weeks of gestational age. All the research participants were recruited after obtaining informed consent. The study was approved by Institutional Ethical Committee.

RESULTS

The 50th percentile of the fetal parameter, i.e., BPD, HC, AC, and FL are calculated from the data obtained from the 1000 normal pregnant women ranging from 31 to 40 weeks of gestation. 50th percentile values were nearer to the means of all the parameters. Gradual increase in the BPD, FL, HC and AC were observed along with the gestational age (Table 1).

The data were processed by Pearson correlation coefficient, and it revealed that there was a strong positive correlation between the gestational age and the 50th percentile values of BPD, FL, HC and AC. The gestational age was independent

variable and BPD, FL, HC, and AC were dependent variables. The correlation suggests that as the gestational age increases all the dependent variables were also increased. Significant correlation was observed between gestational age with BPD, FL, HC and AC. All these parameters can be considered as predictors of gestational age.

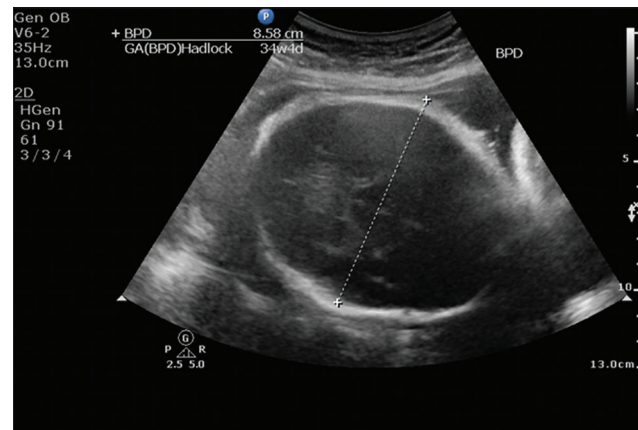


Figure 1: Ultrasonographic image of biparietal diameter of 34 weeks gestation

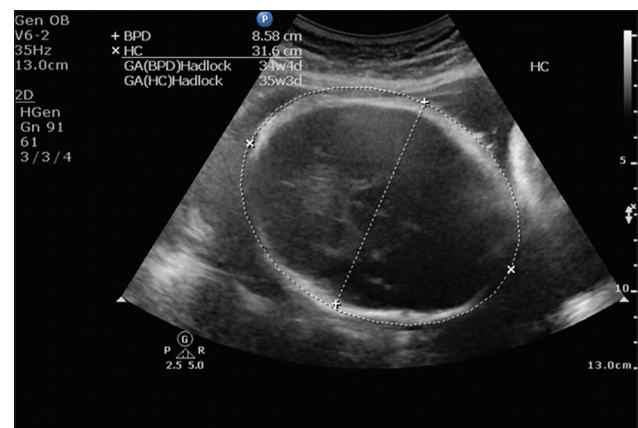


Figure 2: Ultrasonographic image of head circumference of 34 weeks gestation



Figure 3: Ultrasonographic image of abdominal circumference of 34 weeks gestation

Table 1: 50th percentile values of the BPD, HC, AC and FL in fetuses from 31 to 40 weeks of gestation age

Gestational age (in weeks)	Number of cases	BPD	FL	HC	AC
31	82	77	61.88	295.8	275.8
32	104	80	62.2	306.33	285.6
33	99	81.8	65.1	316.4	295.4
34	118	84.5	68	325.8	306.3
35	96	87.4	69.5	331	316
36	101	89.4	71.6	333	321
37	116	92.3	74.2	336	326.3
38	84	94	76	340.5	331
39	128	96	77.8	345.4	335.5
40	72	96.5	78	348	337

BPD: Biparietal diameter, HC: Head circumference, AC: Abdominal circumference, FL: Femur length

Table 2: R, R² and P values

Parameters	R value	R ² value	P value	Level of significance
BPD	0.9959	0.9918	0.00001	P<0.05 very significant
HC	0.9726	0.946	0.00001	P<0.05 very significant
FL	0.9956	0.9912	0.00001	P<0.05 very significant
AC	0.9851	0.9704	0.00001	P<0.05 very significant

BPD: Biparietal diameter, HC: Head circumference, AC: Abdominal circumference, FL: Femur length

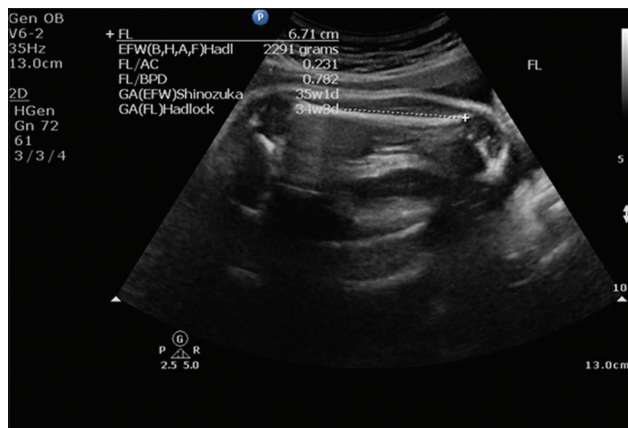


Figure 4: Ultrasonographic image of femur length in 34 weeks gestation

DISCUSSION

USA and UK values were commonly being used as a references chart in the ultrasound machine and most widely accepted for biometry measurement.^{3,4} Hadlock *et al.* stated that the regression equations developed from white middle-class population appeared to be applicable to the populations of different socioeconomic and racial characteristics. Various studies have been reported that Indian fetal biometric values are lower than the Caucasian fetuses.⁴⁻⁷ Lai and Yeo reported that Asians have smaller BPD, HC, AC, and FL when compared with white fetuses.⁸ However, in this study, all the four parameters were similar to the western values. This is supported by Gupta *et al.* that the femoral lengths of Indian fetuses were similar to the western values.⁹

In all the pregnancies, the parameters taken are correlating with the gestational age and hence the ultrasound examination of parameters is a good guide to the age estimation of the fetus.

CONCLUSION

This study on fetal biometry by ultrasonography has attempted to show the importance of assessing the gestational age and fetal growth patterns, in the care and management of the pregnant patient, to date the pregnancy, to distinguish normal from abnormal growth patterns, in antepartum management of complications, for the scheduling of invasive procedures such as chorionic villus sampling, genetic amniocentesis and in the interpretation of biochemical tests such as expanded maternal serum alpha – fetoprotein screening. Allows obstetrician to anticipate formal spontaneous delivery or to plan elective delivery within the time of a term pregnancy.

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Clinical Profile, Management and Treatment Outcome in Urethral Stricture Disease in Male Patients at a Tertiary Care Center

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Abstract

Background: A urethral stricture in the male patients is a common and challenging problem to the urologist, and the search is still on for a satisfactory answer to this complex problem. The treatment depends on the etiology, nature, site, and extent of the stricture.

Aims and Objectives: To study the etiology, clinical presentation, treatment and early treatment outcomes of urethral strictures among patients seeking urological services at MGM Medical College and Hospital, Navi Mumbai.

Materials and Methods: After approval from Ethical Committee, a prospective cohort study of 75 patients was done, over a period of 3-year from August 2012 to August 2015, who were suspected clinically to have urethral stricture and proved on investigations (uroflowmetry, ascending urethrogram and retrograde urethrography, ultrasonography, magnetic resonance imaging, etc.). These patients underwent different modes of treatment.

Results: In this study, a significant association of length with etiology of stricture was observed ($P < 0.001$), on applying *post-hoc* test. Etiological factor for long length stricture was balanitis xerotica obliterans (BXO). Bulbar urethra is the most common site found for both idiopathic as well iatrogenic etiological factors. Overall, success rate of our study was 82.67%. Among all definitive treatment modalities, high success rate was associated with Anastomotic urethroplasty (87.50%) and buccal mucosa urethroplasty (86.50%).

Conclusion: Due to fast life with increasing road traffic accidents and with the advent of newer technological advances, pendulum of etiological factor has shifted from infective to iatrogenic and traumatic etiology. The most common cause of penile urethral stricture is BXO. Buccal mucosa graft urethroplasty is the most versatile surgical option which can treat stricture of almost all aetiologies and length with better success rates.

Key words: Balanitis xerotica obliterans, Buccal mucosa urethroplasty, Stricture urethra

INTRODUCTION

The urethral stricture is a narrowing of the anterior urethra caused by scarring of the urethral epithelium and the spongy erectile tissue of corpus spongiosum. The main causes of urethral stricture in India are trauma, iatrogenic,

and inflammation.¹ The traumatic strictures are becoming increasingly important due to increase in civil violence and injury following road traffic accidents. Lichen sclerosus balanitis xerotica obliterans (BXO) usually begins with inflammation of the glans and foreskin and inevitably causes meatal stenosis, if not a true stricture of the fossa navicularis. Urethral dilation is the oldest and simplest treatment of urethral stricture disease for the patient with an epithelial stricture without spongiofibrosis who are not willing to undergo a reconstructive procedure and/or not fit for anesthesia. Direct visual internal urethrotomy (DVIU) is best utilized for short superficial strictures <1.5 cm that involves the bulbar urethra or in post-urethroplasty failure cases. Anastomotic urethroplasty is

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considered the gold standard for the short strictures as it has the best long-term results, longer strictures are best managed with substitution urethroplasty. Buccal mucosa graft (BMG) has emerged as a reliable urethral substitute with long-term results comparable or superior to penile flaps.² BMG is easy to harvest and trim, more resistant to infection than skin, flexible and has thick lamina propria and excellent microvasculature favorable for graft imbibition and inosculation. The natural location of BMG in oral wet environment favors easy adaptability in the urethral passage, thus giving long-term results.

Aims and Objectives

Aim

To study the etiology, clinical presentation, treatment, and early treatment outcomes of urethral strictures among patients seeking urological services at MGM Medical College and Hospital, Navi Mumbai.

Objectives

To study the frequency of urethral strictures at various sites in the urethra.

To compare early treatment outcomes in relation to the treatment given.

MATERIALS AND METHODS

After approval from Ethical Committee, a prospective cohort study of 75 patients was done, who were suspected clinically to have urethral stricture and proved on investigations (uroflowmetry, ascending urethrogram and retrograde urethrography, ultrasonography, magnetic resonance imaging (MRI), etc.). These patients underwent different modes of treatment. Study included:

1. Taking detailed history of patients including the history of any obstructive and irritative voiding symptoms, urinary retention, any instrumentation. If buccal mucosa urethroplasty (BMU) was planned and history of tobacco chewing was present than patient was advised to stop tobacco chewing and start oracep gargles
2. Detailed physical examination including the foreskin and meatus for changes of BXO and urethral induration, perineum for scar of previous surgery, suprapubic site for any suprapubic catheterization (SPC) scar, availability of foreskin and scrotal laxity if flap was required.
3. Investigations:
 - a. Urine routine and microscopy and culture for infection
 - b. Ultrasonography for pre- and post-voids residual urine, bladder thickness, and any back pressure changes due to long-standing bladder outlet obstruction

- c. Uroflowmetry to see Qmax, prolonged duration of maturation and flow pattern
- d. Ascending urethrogram and micturating cysturethrography to see site, length, depth of stricture and to see any associated complication like fistula, diverticulum, and false passage
- e. MRI if symptoms of complex stricture like failed urethroplasty and multiple fistula.
4. Routine investigation for fitness for surgery
5. If symptomatic UTI then control of infection
6. Management depending on site, length, depth and etiology of stricture and previous surgery
7. After urethroplasty, the patient was subjected to pericatheter urethrogram after 3rd-4th week postoperatively depending on the complexity of stricture.

Follow-up protocol: Patients were followed up in terms of history, physical examination and flow rate after 4 weeks, 3 months and 6 months postoperatively and urethrogram and cystoscopy at 4 weeks.

Failure was defined postoperatively if any one of the following seen:

1. Poor flow rate (Qmax <15 ml/s)
2. Abnormal urethrogram or urethroscopy and
3. Need for any intervention if patient symptomatic.

RESULTS

Most common location observed intraoperatively was bulbar in 42 (56%) cases, followed by penile in 13 (17.33%), bulbar+penile in 7 (9.33%), pan urethral in 11 (14.67%), penile+fossa navicularis in 2(2.67%) cases.

In the case of pan urethral stricture BXO being the most common etiology. Bulbar urethra is the most common site found for both idiopathic as well iatrogenic etiological factors.

Among all definitive treatment modalities, high success rate was associated with anastomotic urethroplasty (87.50%) and buccal mucosa urethroplasty (86.50%).

Buccal mucosa urethroplasty was associated with slightly higher complication rate as compared to other treatment modalities, e.g., penile edema, pericatheter pus discharge, and urinary tract infection.

DISCUSSION

In our study, mean age of patients was 42.03 ± 15.73 years (range 16-84 years). The most common age group was

21-30 years (24%) followed by 41-50 years (22.67%) and least were in extremes of age. In our study, the most common etiology was idiopathic in 29 (38.67%) patients. Next common etiological factor was iatrogenic in 20 (26.66%) patients (previous catheterization in 18.66% and previous instrumentation in 8% patients) followed by trauma in 13 (17.33%), BXO in 8 (10.67%) and infection in 5 (6.67%) patients. According to Rourke and Hickel³ etiology was idiopathic in 47.0%, iatrogenic in 19.6%, trauma in 12.1%, and in BXO in 14.2% cases. Fenton *et al.*⁴ also showed that nowadays most common etiology is idiopathic and iatrogenic. Infection was the least common cause of stricture in our study. Some decades ago, the most important cause of urethral stricture was infection, but with the effective and efficient control of infection, the incidence of stricture secondary to infection has significantly reduced however due to extensive transurethral surgery iatrogenic etiology is uprising. BXO caused stricture in 8 (10.67%) cases. Palminteri *et al.* demonstrated that BXO was a cause of stricture in 13.5% of cases.¹ Incidence of BXO is variable in literature as Barbagli *et al.*⁵ and Venn and Mundy⁶ have shown incidence 25% and 30%, respectively. Although the higher mean age (47.75 ± 17.28 years) was observed in iatrogenic strictures, followed by in BXO induced (46.25 ± 11.9 years) and lower age (29.00 ± 15.18 years) was observed in infective and traumatic strictures (37.31 ± 11.33 years) but no statistically significant difference was observed between age and the etiology.

Symptoms at presentation were LUTS in 56 (74.66%) patients (out of these 67.86% patients presented with only voiding symptoms, 32.14% patients presented with both voiding and storage symptoms), acute urinary retention in 13 (17.33%) patients, pain in perineal region in 6 (8%) patients, incontinence and SPC in situ 4 (5.33%) patients each, which is also similar to other studies^{3,7} mentioned in literature. No patient presented with only storage symptoms. In our study, 15 (20%) patients required emergency intervention in the form of suprapubic catheterization for acute urinary retention, multiple fistula or abscess.

In our study, 12 (16%) patients presented with abnormal findings on local examination. Most patients with abnormal findings showing signs of BXO (10.67%) with or without meatal stenosis, so genital and perineal examination is very important in the evaluation of urethral stricture patients. Apart from history and local examination uroflowmetry and urethrography (ascending and micturating [Figure 1]) was helpful in making the diagnosis of urethral stricture. Mean Q max was 7.38 ± 2.714 ml/s and most patients presented with the typical graph (extended urination time with a low-level plateau). The mean length of stricture on

urethrogram was 2.82 ± 2.344 cm. which was showing good correlation with intraoperative findings showing high sensitivity and specificity of ascending urethrogram as mentioned by El-Ghar *et al.* in literature.⁸

Most common location of stricture in our study was bulbar region (Table 1) in 42 (56%) patients which are similar to other studies,^{4,9,10} followed by penile strictures in 13 (17.33%) patients. Pan urethral stricture was present in 11 (14.67%) patients. There is statistically significant association noted between etiology and location of stricture. In bulbar region idiopathic and iatrogenic strictures were more common than other etiological factors (Table 2). In pan urethral strictures BXO was the most common etiology (54%), followed by iatrogenic (36%) and infection (9%) which shows that apart from BXO any instrumentation or catheterization can cause severe inflammation resulting into panurethral stricture. Palminteri *et al.*, demonstrated that LS is the most common cause of pan urethral stricture (48.6%).⁴ In our study, in the case of BXO patients pan urethral strictures (75%) was most common finding. Iatrogenic and idiopathic strictures were more common in bulbar region. Most trauma induced strictures (92.31%) were present in bulbar region.

In our study, mean length was 3.613 ± 3.0850 cm which is comparable to other studies.^{4,9,10} Among all patients,

Table 1: Distribution of the cases according to intraoperative location

Intraoperative location	Frequency (%)
Bulbar	42 (56)
Bulbar+penile	7 (9.33)
Penile	13 (17.33)
Penile+fossa navicularis	2 (2.67)
Panurethral	11 (14.67)
Total	75 (100)



Figure 1: Ascending urethrogram showing bulbar stricture

Table 2: Association of intraoperative location with the etiology of urethral stricture

Site	n (%)				
	BXO	Iatrogenic	Idiopathic	Infection	Trauma
Bulbar	0 (0.00)	10 (50.00)	19 (65.52)	1 (20.00)	12 (92.31)
Bulbar+penile	0 (0.00)	3 (15.00)	2 (6.90)	1 (20.00)	1 (7.69)
Panurethral stricture	6 (75.00)	4 (20.00)	0.00	1 (20.00)	0 (0.00)
Penile	2 (25.00)	3 (15.00)	6 (20.69)	2 (40.00)	0 (0.00)
Penile+fossa navicularis	0 (0.00)	0.00	2 (6.90)	0 (0.00)	0 (0.00)
Total	8 (100.00)	20 (100.00)	29 (100.00)	5 (100.00)	13 (100.00)

BXO: Balanitis xerotica obliterans

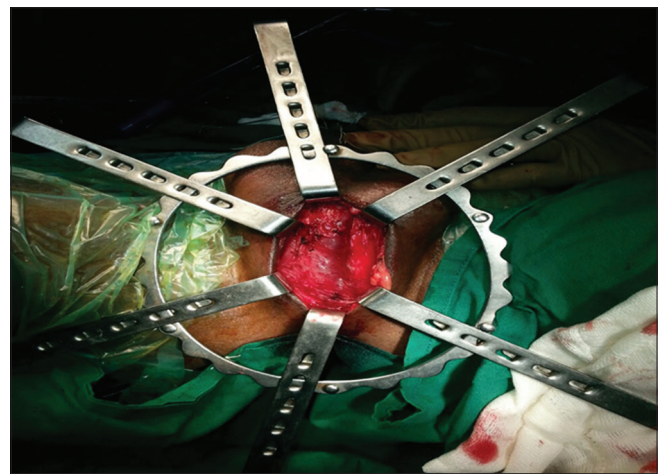
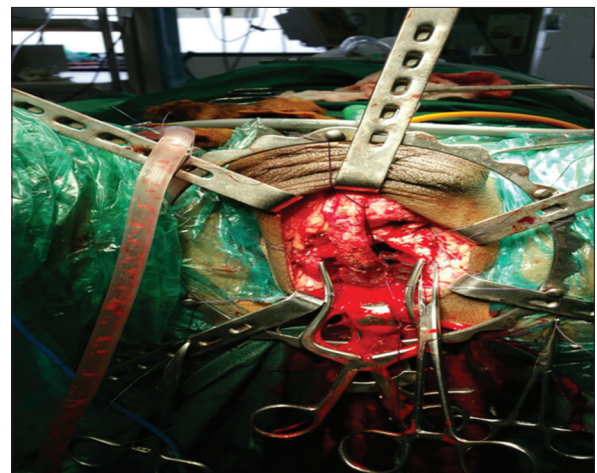
12 (16%) patients presented with stricture length >5 cm. Significant association of length with etiology of stricture was observed in our study ($P < 0.001$ S). BXO induced, iatrogenic and infective strictures had a more mean length (9.13 cm, 4.05 cm, 3.10 cm, respectively) as compared to others causes and this can be explained by inflammatory pathology being the basis of all these etiological factors.

Overall success rate in our study was 82.67%. The success rate for dilatation was 57.14% which is comparable to another study by Vicente *et al.*¹¹ with minimal complication so poor success rate shows that it is only palliative procedure not curative. For all recurrent cases again endoscopic dilation was done as these patients were not fit for any definitive surgery. The success rate of DVIU in our study was 70% which is almost comparable to studies done by Jezior¹² and Wein *et al.*,¹³ but it is a short follow-up of only 6 months so chances of failure in long follow-up can be even high. All recurrent patients were advised BMU. Lauritzen *et al.*, demonstrated a significantly decreased stricture recurrence rate in the self-catheterization group (9%) versus the observation group (30%).¹⁴ In our study, there was no complication noted in intraoperative or immediate post-operative period after VIU.

Anastomotic urethroplasty (Figures 2 and 3) was done in 16 (21.33%) patients with success rate of 87.50% (Table 3). Other studies in literature also have similar success rate.^{2,15,16} Among 2 recurrent patients, 1 patient was treated with VIU and CIC and one was advised for BMU but he did not follow-up. In properly selected patients (bulbar stricture of <2 cm of non-inflammatory pathology) anastomotic urethroplasty has excellent results. In present study 5 (27.50%) patients developed complications in the immediate post-operative period. 3 (18.75%) patients developed urinary tract infection, 2 (12.50%) patients developed pericatheter pus discharge and 1 (6.25%) developed wound infection but all complication were well managed successfully (Table 4). Chances of failure are high in inflammatory stricture so inflammatory and long bulbar strictures should be treated by augmentation. In penile urethra due to lack of elasticity, it cannot be mobilized so excision of the urethra can cause shortening of

Table 3: Association of the success rate with different treatment modalities

Treatment modalities	Total	Success	Percentage
Anastomotic urethroplasty	16	14	87.50
Buccal mucosa urethroplasty	38	33	86.84
Endoscopic dilatation	7	4	57.14
Perineal urethrostomy	4	4	100
Visual Internal urethrotomy	10	7	70.00
Total	75	62	82.67

**Figure 2: Intraoperative view of initial incision and dissection in a case of excision with end to end anastomotic urethroplasty****Figure 3: Intraoperative view of urethra after anastomosis in anastomotic urethroplasty**

urethra leading to chordae so for penile urethral strictures augmentation urethroplasty is indicated irrespective of length and etiology of stricture.

In our study, the majority of patients (50.67%) were treated by augmentation urethroplasty with buccal mucosa (Figure 4). We did not use any local tissue flap for augmentation. In our study, 38 (50.67%) patients underwent buccal mucosa urethroplasty with success rate of 86.84% in short follow-up. Literature also suggests that BMU has success rate 84-96%.¹⁷⁻¹⁹ These variations noted in success rates between different studies could be due to variations in the duration of follow-up period. In this study, 5 (13.16%) patients developed recurrence. Among them, 1 patient developed urethrocutaneous fistula in the immediate post-operative period but he didn't turn up for further management. Redo BMU was done in 2 patients and VIU and CIC advised for rest of 2 patients. Pansadoro *et al.*,²⁰ and Barbagli and De Stefani²¹ have reported Stensen's duct damage, intraoperative bleeding, facial hematoma, infection, subjective local disturbances, neural damage, retraction from scar (lip/cheek distortion), and limited mouth opening. Slight oral discomfort was reported for only 2-3 days postoperatively by few patients. All patients were able to resume eating a regular diet on 2nd post-operative days, and none of the patients developed any major donor site morbidity. 20 (52%) patients developed minor post-operative complication which is slightly higher as compared to patients who underwent anastomotic urethroplasty group which is explained by complexity of the procedure. In our study, 35 patients underwent one-sided anterior dorsal onlay oral mucosa graft urethroplasty described by Kulkarni *et al.*²² while preserving the lateral vascular supply to the urethra, central tendon of the perineum, the bulbospongiosum muscle, and its perineal innervations so decreasing iatrogenic

impotence, ejaculatory problems, and postvoid dribble. In our study, 3 patients underwent ventral only for proximal bulbar strictures.

Eleven (14.67%) patients presented with pan urethral strictures and most of them are caused by inflammation either by BXO (54%) or iatrogenic cause (36%). We treated all patients in a single stage by Kulkarni's technique²³ using buccal mucosa with good results. Buccal mucosa from both cheeks can be used to gain additional length without adding any significant morbidity. Thus, it is clear that now the trends have moved toward using single-stage repair for difficult strictures of the anterior urethra due to BXO, and the substitute of choice is BM graft. The single-stage procedure is not appropriate for everyone, and poor patient selection can decrease success rates considerably. Two-stage repair is indicated for elderly, extensive involvement of glans and meatus by BXO and non-salvageable urethral plate. The current opinion is that the most prevalent graft for urethroplasty is probably the BM.

CONCLUSION

Irrespective of etiological factors bulbar urethra is the most common site to be get involved by stricture pathology. Before the advent of effective antibiotic treatment, infective etiology was the most common cause of stricture urethra. Due to fast life with increasing road traffic accidents and with the advent of newer technological advances, pendulum of etiological factor has shifted from infective to iatrogenic and traumatic etiology. The most common cause of pan urethral stricture is BXO. BMG urethroplasty is the most versatile surgical option which can treat stricture of almost all etiologies and length with better success rates.



Figure 4: After complete augmentation of the urethral plate by buccal mucosa graft

Table 4: Association of complication with different treatment modalities

Treatment modality	n (%)
Anastomotic urethroplasty (n=16)	
Pericathater pus discharge	2 (12.5)
Urinary tract infection	3 (18.75)
Wound infection	1 (6.25)
Buccal mucosa urethroplasty (n=38)	
Fistula	1 (2.63)
Penile oedema	4 (10.53)
Pericathater pus discharge	5 (13.16)
Urinary tract infection	6 (15.79)
Wound infection	4 (10.53)
Endoscopic dilatation (n=7)	
Penile oedema	1 (14.29)
Urinary tract infection	2 (28.57)
Perineal urethrostomy (n=4)	
Wound infection	1 (25)
Visual internal urethrotomy (n=10)	
Complication	0 (0)

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Assessment of the Relevance of Interval Appendicectomy in Treatment of Appendicular Lump: A Prospective Study

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Abstract

Introduction: In the case of appendicular lump, nowadays, multiple options have emerged including emergency appendicectomy by open or laparoscopically, conservative management with interval appendicectomy and conservative management without interval appendicectomy.

Aims and Objectives: This study was undertaken to prove or disprove the relevance of interval appendicectomy following successful conservative management of cases of appendicular lump.

Materials and Methods: All cases of appendicular lump were included in the study and divided into three Groups - (a) those undergoing emergency appendicectomies, (b) Those undergoing conservative treatment followed by interval appendicectomies after 6-12 weeks interval after lump subsided, (c) Those undergoing conservative management without interval appendicectomies after lump subsides.

Results: Out of 165 cases of appendicular lump 55 were operated within 24 h of admission and rest 110 were treated conservatively on Ochsner-Sherren regime of which 102 cases (92.7%) responded successfully with complete resolution of lump. Among these 102 cases, 49 patients were masterly followed up at regular interval and no operation was required at all with only 4 (8.16%) cases reported with mild recurrence which got relieved on nonoperative treatment. In 53 patients of interval appendicectomy, post-operative complication occurred in 9 (17%) with longer hospital stay because of need for the second admission for interval appendicectomy.

Conclusion: The role of interval appendicectomy has come under serious doubt after successful emergence of emergency appendicectomy and purely conservative treatment without appendicectomy.

Key words: Appendicular lump, Interval appendicectomy, Treatment

INTRODUCTION

Among cases of acute abdomen coming to surgical emergency, acute appendicitis is one of the most common of which 2-10% of cases present with appendicular lump.¹⁻³ Appendicular lump is formed by inflamed appendix surrounded by greater omentum, bowel loops including

edematous cecal wall and ileum.^{1,4} The lump is one of the outcomes of acute appendicitis on the 3rd day of commencement of acute appendicitis which can be felt as tender mass in right iliac fossa.⁵

Although appendicectomy is the treatment of choice in acute appendicitis without lump but management of appendicular lump remains controversial still today with the emergence of multiple options.^{6,7} Age old classical management is of initial conservative regimen as advocated by Ochsner in 1901 with intravenous fluid and wide broad-spectrum antibiotics until lump resolves followed by interval appendicectomy after 6-12 weeks.⁷ This conservative approach was advocated due to fear of spreading infection which nature is localizing by

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early operative intervention. With the improvement in anesthesia, introduction of effective antibiotics and better supportive care immediate appendicectomy during initial admission⁸ was recommended with pleas of cost-effective, shorter hospital stay, and obviating the need for the second admission. Recently another option of initial conservative management of appendicular lump without interval appendicectomy has been put forward on the argument that only 5-20% of these cases develop recurrent appendicitis⁹⁻¹¹ and risk becomes minimal after first 2 years of initial attack.

Thus, this study was undertaken to assess the relevance of interval appendicectomy in the light of emergence of options of early appendicectomy and no-appendicectomy at all.

MATERIALS AND METHODS

This prospective study was conducted from May 2010 to April 2016 (6 years) in the Department of Surgery of R. D. Gardi Medical College, Ujjain, Madhya Pradesh, Sri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, Uttarakhand and SGT Medical College, Gurgaon, Haryana. All the patients presenting with appendicular lump were included in the study. All these patients were clinically evaluated and properly investigated including routine investigations, ultrasound and if in doubt, computed tomography (CT) abdomen to confirm the diagnosis of appendicular lump excluding another differential diagnosis. All three treatment options were explained in detail to each patient and his relatives and well-informed consent was taken. Thus, the patients were divided into three groups - Group A, B and C according to treatment option undertaken. The patients in Group A were operated at the earliest (within 24 h of admission), in Group B and C were initially treated conservatively according to Ochsner-Sherren regimen comprising hospitalization with intravenous fluids, broad-spectrum antibiotics like cefixime, gentamicin, metronidazole, etc., and analgesics/antispasmodics. The progress of vitals such as pulse, blood pressure, temperature, respiration and size, tenderness, guarding, and consistency of appendicular lump was checked regularly to monitor the response of conservative management. The patients in Group B and C were discharged after satisfactory resolution of lump and asked to report for follow-up after 6-8 weeks. The patients in Group B were readmitted after 6-12 weeks and subjected to interval appendicectomy while those in the group see were asked to report for follow-up initially 6 weekly and later, 3 monthly after 6 months of initial episodes or immediately if symptoms including pain recur. The variables studied included failure of conservative treatment, total duration of hospital stay, total cost incurred, total loss of days at

work, incidence of recurrent appendicitis and severity of recurrence in Group C patients with or without need for operation, the operative difficulties, total operative time, operative and post-operative complications, operative and histological findings in Group A and B as well as patient's compliance in Group B and C. Data were collected and manually and statistically analyzed.

RESULTS

The study included 165 cases of appendicular lump varying in age from 11 years to 68 years and included 55 females and 110 males (Tables 1 and 2). The major clinical features included pain, (mostly migrating), nausea/vomiting, anorexia, low-grade pyrexia, tachycardia, and tenderness in right iliac fossa with a palpable lump. More than 70% of patients had leukocytosis of $>11000/\text{cm}^3$ with neutrophilia of $>75\%$ in more than $2/3^{\text{rd}}$ of total cases. 55 patients were operated within 24 h and belonged to Group A while rest 110 cases were treated conservatively. Complete resolution of lump occurred in 102 patients (92.7%) out of 110 treated conservatively and in 8 cases (7.3%) abscess developed which was drained operatively without delay and excluded from the study.

Out of those successfully treated conservatively 53 patients opted for interval appendicectomy (Group B) and remaining 49 patients were masterly followed up for 1-3 years without being subjected to any operation (Group C). In Group C out of 49 patients, only 4 (8.16%) developed recurrence within 1 year during follow-up with mild clinical presentation which subsided on conservative treatment and did not require surgery. The total hospital stay in all 3 groups is compared in Table 3 and post-operative complications in operative Group B and C are shown in Tables 3 and 4.

Table 1: Sex distribution of patients (n=165)

Sex	Number of cases (%)
Male	110 (66.7)
Female	55 (33.3)

Table 2: Age distribution of patients (n=165)

Age groups	Number of cases (%)
5-15	5 (3)
16-25	36 (21.8)
26-35	65 (39.4)
36-45	32 (19.4)
46-55	16 (9.7)
56-65	9 (9)
>65	2 (1.2)
Total	165 (100)

Table 3: Total hospital stay

Number of days	Group A early appendectomy (n=55)	Group B interval appendectomy (n=53)	Group C conservative (n=49)	P value
2-5	16 (29.1)	0 (0)	26 (53.1)	<0.001*
6-10	26 (47.3)	15 (28.3)	23 (46.9)	>0.001
11-15	8 (14.6)	32 (60.4)	0 (0)	<0.001*
16-20	3 (5.5)	3 (5.7)	0 (0)	>0.001
>20	2 (3.6)	3 (5.7)	0 (0)	>0.001

*P<0.001: Significant

Table 4: Post-operative complications

Complications	Group A (n=55)	Group B (n=53)	P value
Wound infections	6 (10.9)	3 (5.7)	<0.001*
Residual abscesses	3 (5.5)	1 (1.9)	>0.001
Fecal fistula	2 (3.6)	3 (5.7)	>0.001
Chest complications	4 (7.3)	1 (1.9)	<0.001*
Adhesive intestinal obstruction	2 (3.6)	1 (1.9)	>0.001
Total	17 (30.9)	9 (17)	<0.001*

*P<0.001: Significant

DISCUSSION

The treatment of appendicular mass is taking a topsy-turvy turn in recent years from traditional approach of initial conservative management followed by interval appendicectomy to early appendicectomy (either by open or laparoscopic method) or purely conservative treatment without interval appendicectomy questioning the very relevance of interval appendicectomy though consensus has not reached yet. Ochsner in 1901 introduced nonoperative regime for cases of appendicular mass.¹² Murphy in 1904 proposed elective interval appendicectomy after complete resolution of lump.¹³ Although recently challenged by many authors, a large number of surgeons prefer interval appendicectomy as per survey in North America and England because of their concern for recurrent appendicitis.¹⁴⁻¹⁶ However, many studies have revealed low recurrence rate varying from 5% to 20% with mean recurrence rate of 13.7%¹⁷⁻¹⁹ as in our study too (8.16%). Most of these recurrences occur within first 2 years and milder than primary appendicitis in severity²⁰ which can be managed easily nonoperatively or operatively. However, this means so many patients (more than 80%) being subjected to unnecessary interval appendicectomy which itself carries post-operative complications rate, reported to be 12-23%^{21,22} as well as requires second hospital admission with further cost addition and loss of work days. A recent prospective randomized controlled trial showed purely conservative treatment without interval appendicectomy had the shortest hospital stay with minimal work days loss and only 10% recurrence rate in median follow-up of more than 33.5 months.¹⁷ This correlates well with similar findings in Group C patients of our

study. In another study, too, 83% of appendicular lump cases did not require any intervention in mean follow-up of 15.5 months.¹⁸ Another argument put up in favor of interval appendicectomy is to avoid misdiagnosis of other pathology including cecal or appendicular malignancy, Crohn's disease or ileocecal tuberculosis masquerading as appendicular lump which is reported to be in 10.3% in a recent prospective study with 3% having colon cancer.²³ Thus, cases treated conservatively without interval appendicectomy should be properly investigated during follow-up by barium enema, colonoscopy or CT scan/CT colpography, if need be, to rule out any hidden pathology.

On the other hand early appendicectomy has an edge over conservative management of being curative, obviating the need for second admission, shorter hospital stay, early return to work, and higher patient compliance than interval appendicectomy^{24,25} as well as removes the fear of misdiagnosis. Our study highlights the feasibility and effectiveness of early appendicectomy in appendicular lump and the results are consistent with a number of similar studies.²⁶ Earlier belief that surgery is difficult in appendicular lump with chances of more bleeding, or perforating friable bowel loops is no more valid argument with advancement in anesthesia, supportive care, and better antibiotics. The operative difficulties such as localizing appendix, adhesions, and bleeding are more troublesome in interval appendicectomy rather than in early appendicectomy as findings of present and other studies suggested. However, higher wound infection rate remains a common post-operative complication in early appendicectomy.

CONCLUSION

Traditional conservative management of appendicular mass holds good result in vast majority of cases with complete resolution. Low incidence of recurrent appendicitis following successful conservative treatment obviates the need of interval appendicectomy except in few cases not willing to take that low risk of recurrence or to exclude alternative diagnosis. The success of emergency appendicectomy by open or laparoscopic method further erodes the relevance of interval appendicectomy in the treatment of appendicular lump though last word is yet to be said and requires further prospective randomized controlled trials in larger groups in different global areas.

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Serum Magnesium in Patients with Acute Myocardial Infarction

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Abstract

Introduction: Magnesium is also known for its role in the electrical stability and energy balance of cardiomyocytes. Low serum magnesium has been associated with accelerated atherosclerosis.

Aim: To estimate the level of serum magnesium in patients with acute myocardial infarction and compare with a normal healthy adult.

Materials and Methods: A prospective study was conducted in the Department of Biochemistry at Mahatma Gandhi Memorial Medical College, Jamshedpur. 40 patients with diagnosed case of acute myocardial infarction from Medicine Department were selected for estimation of serum magnesium in Department of Biochemistry. 40 normal healthy adults of both sexes in the age group of 30-79 years were selected for serum magnesium estimation as a control.

Result: Serum magnesium concentration in acute myocardial infarction group ranged from 0.42 to 1.56 meq/l with a mean value of 1.01 meq/l and it is statistically significant ($P < 0.01$).

Conclusion: Within first 48 h after a heart attack, 80% of patients have hypomagnesemia. This could be the result of an intracellular shift because of an increase in catecholamines.

Key words: Acute myocardial infection, Arrhythmia, Hypomagnesemia

INTRODUCTION

Hypomagnesemia is an electrolyte disturbance in which there is low level of magnesium in blood.¹ Magnesium is an essential micronutrient for human beings and plays an important role in normal myocardial physiology. It's a cofactor in more than 300 enzymes system of the body in human cell. Its possible site of action includes vascular smooth muscle, platelets, and myocardial cells.² Magnesium depletion can induce hyperlipidemia and subsequently atherogenic deposits in coronary arteries leading to atherosclerosis.³

Normal magnesium level fall between 1.7 and 2.2 meq/L. Usually, a serum level <1.7 meq/L is taken as reference.

Hypomagnesemia may result from a number of conditions including inadequate intake of magnesium, chronic diarrhea, malabsorption, chronic stress, alcoholism, and medication such as diuretic.⁴

Magnesium is of major importance in the treatment of arrhythmia and coronary artery disease. Patients with coronary heart disease (CHD) suffer from magnesium deficiency. Oral combination therapy with magnesium and potassium improves endothelial function in these patients and reduce platelet dependent thrombosis. Within the myocardial cell, low magnesium concentration is associated with membrane destabilization, while high magnesium concentration are membrane stabilizing and therefore antiarrhythmic. Magnesium is a potent vasodilator^{5,6} and plays an important role in muscle contraction.⁷ CHD features among the indications for oral magnesium therapy. It could be shown that magnesium improves exercise duration and general well-being in these patients. Individuals treated with intravenous magnesium postinfarction were at significant lower risk of dying from ischemic heart disease-related complications.^{8,9}

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MATERIALS AND METHODS

Our study was undertaken in the Department of Biochemistry, Mahatma Gandhi Medical College and Hospital (MGM), Jamshedpur. Ethical approval was taken from Institutional Ethics Committee of MGM. 40 patients with diagnosed case of acute myocardial infarction were selected for estimation of serum magnesium. The control group comprised normal healthy individual of both sexes in the age group of 30-79 years. An informed consent was taken. Serum magnesium was estimated with Talmagite Method.

RESULTS

The above Table 1 shows a significant decline in serum magnesium concentration in the cases of acute myocardial infarction, in comparison to healthy adult (control group). In this study, serum magnesium was estimated in clinically diagnosed case of acute myocardial infarction and healthy adult of both sexes and different age group as the control group.

Maximum numbers of patients with myocardial infarction were in the age group 40-69 years. Out of 40 control cases, 25 cases belonged to 40-69 years of age. Serum magnesium concentration in this group ranged from 1.6 to 3.0 meq/L with a mean value of 2.20 meq/L. Out of 40 cases of acute myocardial infarction, 29 cases belonged to 40-69 years of age. 29 were males and 11 were females. A higher incidence of myocardial infarction in male corroborates the fact that incidence of ischemic heart disease is significantly less in premenopausal women. The serum magnesium concentration in acute myocardial infarction group ranged from 0.42 to 1.56 meq/L with a mean value of 1.01 meq/L and found to be statistically significant ($P < 0.01$).

DISCUSSIONS

Patients with acute myocardial infarction who have mild hypomagnesemia appear to have two- to three-fold increase in the frequency of ventricular arrhythmia in the first 24 h when compared to those with normal plasma magnesium level.^{10,11} Uncontrolled studies suggest that

the administration of intravenous magnesium at this time can reduce the frequency of potentially fatal ventricular arrhythmia.^{12,13}

Magnesium is also known for its role in the electrical stability and energy balance of cardiomyocytes.¹⁴ Low serum magnesium has been associated with accelerated atherosclerosis.¹⁵ QT prolongation is a well-established risk factor for sudden cardiac disease,¹⁶ and serum magnesium was shown to influence the QT interval in a clinical setting.¹⁷

The American Heart Association 1992 guidelines for cardiopulmonary resuscitation and emergency cardiac care now include a recommendation that magnesium sulfate be added for the management of torsade de pointes, severe hypomagnesemia, or refractory ventricular fibrillation.¹⁸ Torsade de pointes is a unique ventricular tachycardia most commonly precipitated by drugs that prolong QT interval (e.g., Quinidine), electrolyte imbalance (hypokalemia and hypomagnesemia) or a slow heart rate and/or shortening the QT interval. Intravenous magnesium is now regarded as the treatment of choice even when hypomagnesemia is not present.

Two large prospective epidemiologic studies have examined the relationship between serum magnesium concentration and the subsequent development of CHD.¹⁹ Both suggest that low serum magnesium is a risk factor for CHD.

Mild hypomagnesemia is a common electrolyte abnormality,²⁰ particularly in the elderly who have increased magnesium loss due to diuretic therapy or interstitial renal disease. Magnesium regulates several cardiac channels including the calcium channel and outward potassium current through the delayed rectifier.²¹ Lowering the cytosolic magnesium concentration in magnesium depletion will markedly increase these outward currents, shortening the action potential, and increasing susceptibility to arrhythmia. A relationship has also been found between the plasma magnesium concentration and ventricular arrhythmia occurring in the second or 3rd week after myocardial infarction.

In one study, for example, the mean plasma magnesium concentration was 1.83 mg/dl (0.76 mmol/L) in patients with no abnormal rhythm, 1.68 mg/dl (0.7 mmol/L) in those with multifocal ventricular premature complexes and 1.5 mg/dl (0.65 mmol/L) in those with unsustained ventricular tachycardia.²² 13 patients with complex arrhythmia and hypomagnesemia received IV magnesium over 24 h, a normal rhythm was restored in ten.

Low serum magnesium has been implicated in cardiovascular mortality, but results are conflicting. Total body magnesium

Table 1: Comparison of serum magnesium in control group with acute myocardial infarction

Serum magnesium (meq/L)	Control group	Acute myocardial infarction
Range	1.60-3.00	0.42-1.56
Mean±SD	2.20±2.23	1.01±0.94
Standard error of mean (±)	0.35	0.14

*P" value for acute myocardial group was <0.01. SD: Standard deviation

depends on dietary intake and recent studies showed that vast majority of elderly do not consume the average dietary requirement for magnesium.²³ The prevalence of magnesium in the general population is estimated at 2%,²⁴ but it may be as high as 53% in specific high-risk group such as patients with chronic heart failure.²⁵ Although hypomagnesemia may have acute and chronic complications, serum magnesium is still measured relatively in frequently.²⁶

In recent study, low serum magnesium has been associated with inflammation²⁷ and disturbance in the regulation of vascular tone and endothelial function.^{28,29} These mechanisms are thought to contribute to the development and progression of atherosclerosis, potentially worsening CHD.³⁰

CONCLUSION

Magnesium influences endothelial function, inflammation, blood pressure, and diabetes.³¹ With the first 48 hrs after heart attack, 80% of patients have hypomagnesemia. This could be the result of an intracellular shift because of an increase in catecholamines.

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Effects of Tobacco Chewing on Cardiovascular Autonomic Function

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Abstract

Background: Knowledge on the effects of tobacco smoking is well known, but the knowledge on the effects of tobacco chewing on the cardiovascular system is limited. The present study was undertaken to find out the association between the tobacco chewing and the alteration in the cardiovascular autonomic regulation.

Materials and Methods: A total of 40 healthy adult male participants were recruited in that 20 were non-chewers and 20 were chewers of tobacco. The chewers were again divided into the users of <10 years and users of more than 10 years. The resting heart rate, standing heart rate, systolic and diastolic blood pressures were recorded for controls and for the chewers before and after chewing. For tobacco chewers, blood pressure was recorded as before and after grip.

Results: Significant increase in the resting and standing heart rates of the tobacco users of <10 years was observed. In the tobacco users of more than 10 years, the heart rate was increased but not statistically significant. There was no significant difference in the blood pressures of chewers.

Conclusion: Tobacco chewing has a definite impact on the autonomic regulation of heart rate. It can be considered as one of the risk factors causing cardiovascular disease.

Key words: Blood pressure, Chewing, Heart rate, Tobacco

INTRODUCTION

India is one among the world's top five tobacco producers and consumers. The WHO attributed 4 million tobacco-related deaths every year and is expected to raise 8.4 million deaths by 2020.¹ Two major forms of tobacco use in India are smoking (bidis or cigarettes) and chewing.² Gutka or gutkha is the industrially prepared smokeless tobacco most commonly available in India, Pakistan, South East Asian countries, and also UK. In India, growth of gutka is rapid and has overtaken smoking of tobacco, especially among the young generation and women.^{3,4}

Cardiovascular disease (CVD) is the leading cause of death worldwide, responsible for over 17 million deaths globally

and tobacco has been estimated to directly cause 10% of all CVD worldwide. The epidemiological evidence on cigarette smoking in relation to CVD is well known, but the relationships between CVD and chewing of tobacco is limited and remains uncertain.^{3,5,6} The present study was carried out to find out the effects of tobacco chewing on cardiovascular autonomic function.

MATERIALS AND METHODS

The present study consists of 40 healthy male volunteers - 20 non-chewers (non-users) and 20 chewers (users) of tobacco between 20 and 50 years of age. Care was taken to see the average age of controls and chewers were same. Tobacco chewers were divided into users of <10 years and users of >10 years. Thus, there were 3 groups. They are non-users, users of >10 years, and users of <10 years. Research participants with major illness and history of CVDs such as chest pain, dyspnea, and palpitations were excluded from the study. All the research participants were explained about the procedures and recruited after obtaining informed consent.

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Methodology

For controls

After explaining the procedure, the Research participants or subjects were asked to sit at ease, and the resting heart rate was recorded. Participants were asked to stand after recording resting heart, and the standing heart rate was recorded. To record resting blood pressure before grip, the participants were asked to sit comfortably, and the systolic and diastolic blood pressures were recorded. To record blood pressure after grip, the participants were asked to hold a circular wooden ruler firmly, and then, the systolic and diastolic blood pressures were as the participants were maintaining the sustained hand grip.

For tobacco chewers

Before chewing tobacco, the resting heart rate, standing heart rate, systolic and diastolic blood pressures before grip, and systolic and diastolic blood pressures after grip were recorded as the same method in controls. Then, each participant was given one sachet of Goa, the popular brand of gutkha to chew. After 5 min of chewing, the resting heart rate, standing heart rate, systolic and diastolic blood pressures before grip, and systolic and diastolic blood pressures after grip were recorded.

RESULTS

Resting heart rates of all the 3 groups were similar before chewing (Table 1). However, the heart rate before versus after chewing in the users of <10 years duration shows statistically significant increase in the resting heart rate after chewing (Table 1a). The heart rate before versus after chewing in users of >10 years duration shows no statistically significant difference in the heart rate though the average seems to be a little higher after chewing (Table 1b). Probably, this is an effect of long-term habituation of cardiovascular system to chewing tobacco.

The mean values of standing heart rates of all the 3 groups were given in Table 2. There was no statistically significant difference in the standing heart rate of all the 3 groups before chewing. Standing heart rate of users of <10 years duration shows statistically highly significant increase in the standing heart rate after chewing which conforms that there is a definite effect of nicotine on heart rate changes associated to posture (Table 2a). Standing heart rate of the users of more than 10 years duration shows increase in heart rate but not statistically significant (Table 2b).

The mean values of resting systolic and diastolic blood pressures of all the 3 groups were similar before chewing (Table 3). The resting systolic and diastolic blood pressures before versus after chewing tobacco showed no effect on

Table 1: The resting heart rate of all the 3 Groups before chewing

Group	Number of participants	Mean±SD	SE	P
Non-users	20	82.0±5.7	1.28	>0.05
Users <10 years	9	82.8±8.8	2.93	>0.05
Users >10 years	11	76.7±8.9	2.67	>0.05

SD: Standard deviation, SE: Standard error

Table 1a: The resting heart rate before versus after chewing tobacco of users <10 years

Before Vs After	Number of participants	Mean±SD	SE
Before	9	82.8±8.8	2.93
After	9	93.6±9	3.57

T value: 2.57, P<0.05 (statistically significant), SD: Standard deviation, SE: Standard error

Table 1b: The resting heart rate before versus after chewing tobacco of users >10 years

Before Vs After	Number of participants	Mean±SD	SE
Before	11	76.7±8.9	2.67
After	11	85.1±11.8	3.00

SD: Standard deviation, SE: Standard error

Table 2: Standing heart rate before chewing

Group	Number of participants	Mean±SD	SE
Non-users	20	88±5.6	1.26
Users <10 years	9	92.7±8.6	2.87
Users >10 years	11	85.1±10.7	3.23

SD: Standard deviation, SE: Standard error

Table 2a: The standing heart rate before versus after chewing tobacco of users <10 years

Before Vs After	Number of participants	Mean±SD	SE
Before	9	92.7±8.6	2.87
After	9	104.0±8.9	2.96

T value: 2.74, P<0.02 (Highly significant), SD: Standard deviation, SE: Standard error

Table 2b: The standing heart rate before versus after chewing tobacco of users >10 years

Before Vs After	Number of participants	Mean±SD	SE
Before	11	85.1±10.7	3.23
After	11	93.1±10.7	3.24

SD: Standard deviation, SE: Standard error

the resting systolic and diastolic blood pressures of all the groups (users <10 years duration and users of >10 years duration) (Table 3a and b). The systolic and diastolic blood pressures of all the 3 groups were consistently increased after gripping and show a progressive decline from non-users to users <10 years duration to users of

Table 3: Systolic and diastolic blood pressures of all the 3 Groups before grip

Blood pressure	Group	Number	Mean±SD	SE
Systolic blood pressure	Non-users	20	124±8.8	1.97
	Users <10 years	9	124.4±17.4	5.44
	Users >10 years	11	123.6±18.0	5.44
Diastolic blood pressure	Non-users	20	82±8.4	1.89
	Users <10 years	9	77.8±6.7	2.22
	Users >10 years	11	81.5±8.4	2.55

SD: Standard deviation, SE: Standard error

Table 3a: Systolic and diastolic blood pressures of users <10 years before versus after chewing before grip

Blood pressure	Before/after chewing	Number	Mean±SD	SE
Systolic pressure	Before chewing	9	124.4±17.4	5.44
	After chewing	9	114.4±18.8	6.26
Diastolic pressure	Before chewing	9	77.8±6.7	2.22
	After chewing	9	78.9±7.8	2.61

SD: Standard deviation, SE: Standard error

Table 3b: Systolic and diastolic blood pressures of users >10 years before versus after chewing before grip

Blood pressure	Before/after chewing	Number	Mean±SD	SE
Systolic pressure	Before chewing	11	123.6±18.0	5.44
	After chewing	11	122.7±16.2	4.88
Diastolic pressure	Before chewing	11	81.5±8.4	2.55
	After chewing	11	84.4±6.3	1.90

SD: Standard deviation, SE: Standard error

>10 years duration (Table 4a and b). However, there was no statistically significant difference between the elevated systolic and diastolic blood pressures of control and study groups (Table 4).

DISCUSSION

Smokeless tobacco products contain nicotine and known carcinogenic chemicals such as tobacco-specific N-nitrosamines, benzopyrene, nitrate, cadmium, lead, arsenic, nickel, and chromium.^{7,8} Nicotine is the active ingredient in tobacco and is readily absorbed from the respiratory tract, buccal mucous membrane, and the skin. Nicotine in chewing tobacco is more slowly absorbed than inhaled nicotine and has a longer duration of effect. Approximately 80-90% altered in the body, mainly in the liver and also in the kidneys and the lungs.⁹

In the present study, the tobacco chewers of <10 years duration showed an increase in their heart rate after

Table 4: Systolic and diastolic blood pressures of all the 3 Groups after grip

Blood pressure	Before/after chewing	Number	Mean±SD	SE
Systolic pressure	Non-users	20	132.0±7.7	1.72
	Users <10 years	9	130.0±19.4	6.45
	Users >10 years	11	128.2±19.9	6.00
Diastolic pressure	Non-users	20	87±6.4	1.44
	Users <10 years	9	82.9±9.8	3.25
	Users >10 years	11	89.6±9.7	2.91

SD: Standard deviation, SE: Standard error

Table 4a: Systolic and diastolic blood pressures of users <10 years before versus after chewing after grip

Blood pressure	Before/after chewing	Number	Mean±SD	SE
Systolic pressure	Before chewing	9	130.0±19.4	6.45
	After chewing	9	116.7±18.7	6.24
Diastolic pressure	Before chewing	9	82.9±9.8	3.25
	After chewing	9	81.8±10.2	3.39

SD: Standard deviation, SE: Standard error

Table 4b: Systolic and diastolic blood pressures of users >10 years before versus after chewing after grip

Blood pressure	Before/after chewing	Number	Mean±SD	SE
Systolic blood pressure	Before chewing	11	128.2±19.9	6.00
	After chewing	11	127.5±19.4	5.84
Diastolic blood pressure	Before chewing	11	89.6±9.7	2.91
	After chewing	11	89.6±7.8	2.36

SD: Standard deviation, SE: Standard error

chewing tobacco. This is probably due to the effect of nicotine on the autonomic nervous inputs to heart; in particular, this is due to stimulation of catecholamine release by activation of acetylcholine receptors localized on peripheral postganglionic sympathetic nerve endings and the adrenal medulla.¹⁰

In the present study, there was no significant difference in the heart rate of tobacco chewers of more than 10 years. This could be due to the habituation of the cardiovascular system to the effects of nicotine. Similar habituation or tolerance to the effects of nicotine was described in the rodent's brain and brains of human smokers. Perry *et al.* explained that the increase in the density of cholinergic nicotinic receptors in the cerebral cortex and hippocampus modify the central nervous system effects of nicotine and contribute to the altered response to nicotine. The same effect could explain the fact that long-term tobacco chewers did not show significant tachycardia.¹¹

Postural variation of heart rate was estimated by taking standing heart rate immediately after taking resting heart rate. The standing heart rate was increased after chewing for users of <10 years duration. This also could be explained as a response to nicotinic stimulation in the study group. Again this effect was not statistically significant in chronic users.

In the study of the effect of tobacco chewing on arterial blood pressure, it emerges that nicotine seems to have no immediate effect on the short-term regulation of systolic and diastolic blood pressures. This is perhaps in tune with the finding of Perkins *et al.*, who reported substantial acute tolerance to nicotine with regard to blood pressure but less tolerance with regard to heart rate.¹² Gupta *et al.* found the tobacco chewers had a significantly higher blood pressure, heart rate than control group but similar to the smoker group.⁶

CONCLUSION

With the limitations of the present study, it can be concluded that the tobacco chewing is harmful for cardiovascular system as the consumption of tobacco leading to tachycardia.

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Reproductive Factors and Risk of Breast Cancer among Patients Attending the Tertiary Care Hospital in North Bihar

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Abstract

Background: Breast cancer is the most common diagnosed malignancy in women.

Materials and Methods: A total of 57 patients who attended the Surgery Department in Darbhanga Medical College, Bihar, with various forms of malignant breast diseases during the period of November 2009 to November 2011, were studied. The early diagnoses by doing a triple assessment such as a clinical examination, fine needle aspiration cytology, or a core needle biopsy and imaging methods like ultrasonography or mammography. The clinical diagnoses were compared with the cytological or histological findings wherever possible and their accuracies were evaluated.

Results: Out of the 57 patients who were studied, 2 (3.5%) cases were male, a maximum number of malignant cases were encountered in the 5th decade (57%). Most of the patient (78%) presented within 1 year of development of breast lesion. Most of the patients are multiparous more than 6 children (42%). More than 50% of the tumors belonged to TNM stage T2 with palpable axillary lymph node.

Conclusion: Breast cancer occurs a decade earlier in Indian Women as compared with the women of developed countries and is a leading cause of mortality in developing countries like India so raising awareness about the screening procedure and the treatment of breast cancer can help reducing mortality. The clinical diagnosis of a breast lump, as confirmed by cytology and histology, was accurate in most of the cases.

Key words: Breast cancer, Pathology, Risk factors, Triple assessment

INTRODUCTION

Cancer is a major public health problem worldwide causing about 13% of all deaths¹ and has become leading causes of death in India² also, with a prevalence of 2-2.5 million cases at any time.³ In India, cancer causes 7-9 lakh new cases with 3 lakh deaths annually.⁴

Breast cancer is the most common diagnosed malignancy in women worldwide (22%) and in India (18.5%) it ranks second to cervical cancer.

With increasing westernization of life by marrying and bearing children later in life there is an increase in the incidence of breast cancer cases in India. The peak occurrence of breast cancer in developed countries is above the age of 50, whereas, in India, it is above the age of 40.⁵ In India, the age-standardized incidence rate of breast cancer varies between 9 and 32/100,000 women. With an increase in number of reported cases from various registries of national cancer registry project,⁶ India has become a country with a largest number of breast cancer deaths worldwide.^{7,8} In general, the major cause of death in breast cancer is formation of metastases.⁹

A number of various host-related reproductive and lifestyle factors such as literacy, age at menarche and menopause, age at first delivery, abortion, breastfeeding, family history of breast cancer.¹⁰⁻¹⁹ Are very important in affecting the incidence of breast cancer.

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This study attempts to study factors associated with breast cancer in patients attending a tertiary hospital in North Bihar.

MATERIALS AND METHODS

This study was carried on 57 cases at a tertiary center in north Bihar during the period of November 2009 to November 2011. A total of 57 diagnosed cases, of breast cancer were included in this study. The patients were required to give written informed consents before their enrolment in the study. Ethical clearance was obtained from Institute's Ethical Committee.

Inclusion Criteria

Only histologically confirmed cases are included in the study.

Exclusion Criteria

Women with benign disease are excluded from the study.

Detailed histories of patients recorded that includes age, marital status, parity, age at menarche, age at first pregnancy, and age at menopause. The family history of breast diseases, contraception history recorded. Detailed examination of lump and axilla was done with attention to any clinical signs of malignancy. Ultrasonography or mammograms done when required. Fine-needle aspiration cytology (FNAC) performed in patients with lumps to confirm the diagnosis. Core biopsy/incisional or excision biopsy done in patients with inconclusive FNAC report. Data entered on per forma.

RESULTS

A total of 57 patients, who attended in the Surgery Department for breast diseases, were studied in the Department of General Surgery.

A maximum number of malignant cases were encountered in the age group of 41-50 years (5 decade), while both in 4th and 6th decades number of malignant cases were equal (Table 1).

In this series, only two cases was of male breast out of 57 cases (Table 2).

Maximum number of patients reported with the history 1/2 year to 1 year, followed by <6 months, 1 year to 1 1/2 years to 2 years in that order (Table 3).

A maximum number of patients having malignant tumor were having more than 3 up to 6 children, followed by up

to 3 children and an equal number of patients were having no children and more than 6 children (Table 4).

Maximum number of mother having breast cancer had breastfed their babies less than a year, followed by more than a year up to 2 years (Table 5).

Maximum number of breast lesions were found to be of the size of 5-10 cm, followed by 2.5-5 cm and <2.5 cm, in that order (Table 6).

In case of malignant breast tumors, all the palpable lymph glands were hard, mobile and non-tender (Table 7).

Table 1: Distribution of malignant breast tumors according to age

Age in years	Number of cases (%)
20-30	Nil
31-40	12 (21.05)
41-50	33 (57.00)
51-60	12 (21.05)
61 and above	-
Total	57 (100.00)

Table 2: Distribution of malignant breast lump according to sex

Sex	Number of cases (%)
Male	2 (3.5)
Female	55 (96.5)
Total	57 (100)

Table 3: Distribution according to duration of illness

Lesion	<6 months	6 months to 1 year	1 year to 1 1/2 years	1 1/2 years to 2 years	Total
Malignant tumor	21 (36.84)	24 (42.11)	9 (15.79)	3 (5.26)	57

The parenthesis show the percentage of the respective breast lesion

Table 4: Distribution of malignant tumor according to parity

Lesion	Number of children	Up to 3 children	>3 up to 6 children	>6 children	Total
Malignant tumor	6	21	24	6	57

Table 5: Duration of breast feeding in carcinoma of breast

	Number of cases (%)
<1 year	27 (52.94)
1-2 years	24 (47.06)
Total	51 (100.00)

Table 6: Size of lump in various breast lesions

Lesions	Number of cases (cm)			Total
	Up to 2.5	>2.5-5	>5-10	
Malignant tumor	-	27	30	57

Table 7: Lymph node involvement

Lesions	Axillary lymph node					Supraclavicular	Others
	Pectoral	Central	Apical	Brachial	Subscapular		
Malignant tumors	13	13	16	5	2	1	-

DISCUSSION

In this study, a maximum number of malignant cases were encountered in the age group of 41-50 years (5 decades), while both in 4th and 6th decades number of cases were equal similar findings were noted in the study conducted by Meshram *et al.* and, who reported an average age of 48.4 years for cases.¹²

Most of the cases of breast cancer are females only 2 (3.5%) are males. This is in accordance with various studies.²¹

This study showed that most of the patients present within a year of symptoms. This is because of westernization of life in India by marrying and bearing children later in life. A similar finding reported by Gajalakshmi, *et al.*¹⁵

In this study, most of the patients are multiparous more than six children (42%). The most acceptable explanation for a higher incidence of breast cancer in multipara is the fact that women of this part of country marry early and become the mother early, and only very few cases are sterile. An increase in number of births and a decrease in age at first birth were both associated with a lower risk of breast cancer, but the effect of number of births was no longer significant after adjustment for age at first birth.²⁰

In this study, 51 patients (89.47%) had done breastfeeding, whereas 6 patients (10.53%) had no issue, so no question of breastfeeding in them. Among the lactating mothers 52.94% of the patient had done breastfeeding their babies for less than a year, whereas, 47.06 mothers had done breastfeeding their babies for more than a year up to 2 years. It is suggested that breastfeeding had a direct protective factor for the development of breast cancer, but this is contrary to the observation of present study where lactation has not proved to be a protective factor. However, this result is in conformity with the result of MacMahon *et al.*,¹⁶ who in a big study observed no overall important association between breastfeeding and occurrence of the breast carcinoma.

In our study, more than 50% of the tumors belonged to TNM stage T2 with palpable axillary lymph node which agrees with the study conducted by Ahmad *et al.*,²² in Pakistan who also observed similar findings.

CONCLUSION

The study results are in accordance by the results of previous investigations on risk factors for breast cancer. Breast cancer occurs earlier in Indian women as compared with the women of developed countries and breastfeeding and parity is not of protective importance in women of rural India. As there is no consensus on morphological risk factors so by raising awareness and screening procedure with early treatment, breast cancer mortality can be reduced.

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Incidence and Clinical Profile of Leprosy in a Tertiary Care Hospital: A Retrospective Study

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Abstract

Introduction: Leprosy is a chronic disease caused by *Mycobacterium leprae* affecting the peripheral nervous system, the skin, and certain other tissues. Although the prevalent rates of Hansen's disease have shown a downward trend in India, about 50% of the world's burden is from India.

Aim: To study the incidence and type of leprosy in a tertiary care hospital.

Materials and Methods: A retrospective study of people attending our department, who had been diagnosed as leprosy was studied for a period of 4-years from January 2012 to December 2015. Our study group included 168 patients.

Results: Out of 168 patients, 108 were males and 58 were females. There were 2 male children affected by leprosy. There were 98 multibacillary cases and 70 were paucibacillary cases. The highest prevalence of leprosy was seen in the age group of 21-40 years.

Conclusion: Although leprosy is to be eradicated in India, new cases are being continuously reported in all the areas. Our study shows the current status of leprosy in a tertiary care hospital.

Key words: Leprosy, Multibacillary, Paucibacillary

INTRODUCTION

Leprosy has a wide distribution in the world and is most prevalent in the tropics and subtropics. Leprosy is believed to have originated in Asia, and the earliest records of leprosy-like disease come from China and India. The aim of our study was to analyze the incidence, clinical features, and complications encountered in leprosy patients.

MATERIALS AND METHODS

This study was done in the Department of Dermatology, Theni Medical College and Hospital, Theni. A retrospective study was done on leprosy patients. The period of study was from January 2012 to December 2015. 168 leprosy

patients were analyzed. The age, sex distribution, type of leprosy, and complications were studied and results compiled.

RESULTS

A total number of 168 cases were diagnosed as leprosy. Out of 168 cases, 108 were males, 58 females and 2 were male children. The highest incidence of leprosy was seen in the age group of 21-40 years. There were 98 multibacillary (MB) cases and 70 were paucibacillary. Based on Ridley-Jopling classification, there were 100 borderline tuberculoid (BT) cases, 12 borderline lepromatous (L), 4 lepromatous leprosy, and 21 cases were tuberculoid. 8 cases of leprosy were found to have a relapse. There were 27 cases of reactions and deformity occurred in 36 cases. In our study 2 cases were found in contacts and 2 with AIDS developed leprosy (Tables 1-4).

DISCUSSION

In our study, there is a slight increase in the number of cases from 2012 to 2015. The majority of patients belonged to

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Table 1: Age-wise analysis

Age	Number of cases
<20	17
21-40	70
41-60	62
Above 60	19
Total	168

Table 2: Classification of leprosy cases

Type of leprosy	Number of cases
TT	21
BT	100
BB	17
BL	12
LL	04
Pure neuritis	14
Total	168

TT: Tuberculoid, BT: Borderline tuberculoid, BB: Mid borderline, BL: Borderline lepromatous, LL: Lepromatous

Table 3: Sex distribution

Gender	Number of cases
Male	108
Female	58
Male children	02
Female children	00
Total	168

Table 4: Type of leprosy

Type of leprosy	Number of cases
MB	98
PB	70
Total	168

MB: Multibacillary, PB: Paucibacillary

the age group 21-40 years. This is similar to finding reported by Jindal *et al.*¹ Percentage of children affected in our study is only 1.19%, whereas a study by Singal *et al.* reported 9.6% incidence.² Grover *et al.* reported an incidence 7.06%.³ 64.2% males and 34.5% females were affected in our study. This higher incidence in males was similar to a study by Bhattacharya and Sehgal.⁴ The percentage of MB cases was higher than paucibacillary cases in our study. This is similar to the study made by Mohite and Durgawale.⁵ The most frequent morphological type in our study was BT (59.5%) which is similar to observations made by Tiwary *et al.*⁶

CONCLUSION

Although there is a reduction in the number of leprosy cases worldwide, the number of MB cases is on the rise. This has to be curtailed. Active search by field work personnel and intense surveillance can only halt the disease.

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Mortality Profile of Burn Cases: A Retrospective Study

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Abstract

Background: Burn is one of the major causes of death in all medico-legal cases. In India, with a population of over 1.2 billion, there are 700,000-800,000 burns admission annually.

Objective: This study was done to study the mortality profile in autopsy cases with alleged cause of death as burns.

Materials and Methods: The present retrospective study was conducted on 42 autopsy cases brought to the Department of Forensic Medicine, Maharishi Markandeswar Institute of Medical Sciences and Research, Mullana, during the period 2005-2011. All the study variables such as sex, age, percentage, and manner of burns were studied. The data sources were the postmortem reports, hospital records, and police investigation reports.

Results: Out of total 42 cases, 30 (71.43%) were females and 12 (28.57%) were males. Most common manner of burns was accidental (83.34%) followed by homicidal (16.66%). Flame burns were the most common (84.50%) followed by electrical burns (14.5%) and scalds (1%). In 27 cases, the percentage of burns were between 90% and 100%; in 5 cases, the percentage of burns were between 80% and 90%; in 10 cases, the percentage of burns were <80%. Among females, 23 were married and 7 were unmarried. In 83.34% cases, police carried out an investigation under Section 174 criminal procedure code (CRPC) and no foul play was found. 11.9% cases were registered under Section 302 International patent class (IPC), and 4.76% cases were registered under Section 304B IPC as dowry deaths.

Conclusion: In the present study, there was female predominance, with the majority of the cases belonging to the second or third decade of life. Majority of the cases were accidental in nature, but the intent is sometimes difficult to determine for injuries such as burns. Proper prevention program directed at social and environmental changes and providing education to the people will help in inculcating the necessary lifestyle changes and thereby ensuring the safety of our people.

Key words: Autopsy, Accidental, Burns, Death

INTRODUCTION

All of us have experienced the pain that even a small burn causes at some time in our life; it affects all ages and is prevalent in both developing and developed the world. Burn injuries represent one of the most important public

health problems facing both developing and industrialized nations today. Burn is one of the major causes of death in all medico-legal cases. In India, with a population of over 1.2 billion, there are 700,000-800,000 burns admission annually.¹ The exact figure is believed to be higher due to lack of reporting, poverty, illiteracy, and poor standards of safety, this high incidence makes burns an endemic health hazard.

As the etiological factors of burn injuries varies considerably in different communities, careful analysis of the epidemiological features in every community is needed before a sound prevention program can be planned and

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implemented. In India, various sociocultural factors come into play when burns cases are investigated. Some of these factors include dowry deaths, use of firecrackers in festivals, poor housing conditions, illiteracy, and poverty.² This study was done to study the mortality profile in autopsy cases with alleged cause of death as burns.

MATERIALS AND METHODS

The present retrospective study was conducted on 42 autopsy cases brought to the Department of Forensic Medicine, Maharishi Markandeswar Institute of Medical Sciences and Research Mullana, during the period 2005-2011. All the study variables such as sex, age, percentage, and manner of burns were studied. The data sources were the postmortem reports, hospital records, and police investigation reports. Our study had the approval of ethical committee of the college. The study was carried out in accordance with the code of ethics of the world medical association (declaration of Helsinki) for experiments involving humans. Data obtained were saved in Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS Version 20).

RESULTS

Out of total 42 cases, 30 (71.43%) were females and 12 (28.57%) were males. Among females, 13.34% were <18 years, 53.33% were between 18 and 30 years, and 33.33% were >30 years of age. Among males, 10.00% were <18 years, 58.00% were between 18 and 30 years, and 32.00% were >30 years of age. In 83.34% cases, police carried out an investigation under Section 174 criminal procedure code and no foul play was found. 11.9% cases were registered under Section 302 International patent class (IPC), and 4.76% cases were registered under Section 304B IPC as dowry deaths. Most common manner of burns was accidental (83.34%) followed by homicidal (16.66%). Flame burns were the most common (84.50%) followed by electrical burns (14.5%) and scalds (1%). In 27 cases, the percentage of burns were between 90% and 100%; in 5 cases, the percentage of burns were between 80% and 90%; in 10 cases, the percentage of burns were <80%. Among females, 23 were married and 7 were unmarried.

Shock (65.70%) was the most common cause of death followed by septicemia (31.30%) and suffocation (3.0%).

DISCUSSION

In our study, we found that there was a female preponderance as 71.43% of the victims were females. More than half

of these females were in the age group of 18-30 years. This female preponderance is an agreement with other reports from our country as reported by Jaiswal *et al* 2007,³ Khajuria *et al*, 2009⁴ and several other studies⁵⁻⁷ and might be explained by the involvement of females in domestic activities and also to dowry deaths. Sociocultural factors are among the major causes of difference in sex predisposition of burn injuries in developing countries like India as compared to other developed nations. More than half of the total cases were aged between 18 and 30 years. This age distribution found is similar to other studies by Jaiswal *et al* 2007³ and Subrahmanyam (1996).⁸ Higher incidence among young adults both male and female may be explained by the fact that they are generally active and exposed to hazardous situations both at home and work. Due to our social structure, older individuals usually live within the family, thus decreasing their exposure to hazardous situations.

Most of the cases were accidental (83.34%). This is in agreement with studies done from other parts of our country.^{3,9} Total percentage of homicidal cases was 16.66%; out of which, two cases (4.76%) were registered under Section 304B as dowry deaths. No suicidal case was registered. These findings are not in agreement with study done by Shaha and Mohanthy (2006),¹⁰ in which 58.10% cases were homicidal in nature and Khajuria *et al* (2009),⁴ in which 5.3% cases were registered as suicidal deaths. This difference in mortality pattern could be due to the reason that the real facts may have been hidden due to various fears and social pressures as around 71.43% of the victims were females. Most of these were married and in the age group of 18-30 years. Lack of proper police investigation could also be a contributory factor. Among those who died in suspicious circumstances family quarrels, marital disharmony, poverty, and illiteracy were the predisposing factors.

Flame burn was the most common cause (84.50%) followed by electrical (14.5%) and scalds (1%). This is in agreement with the studies done in other parts of our country.³ As regard, the source of flames kerosene stoves was the most common cause. This is consistent with other studies in developing countries, but in industrialized nations flammable liquid and gas stoves were the most common source of flame burns. This difference could be attributed to standard of living and developmental stage of the countries.

CONCLUSION

In the present study, there was female predominance, with majority of the cases belonging to the second or third decade of life. Majority of the cases were accidental in

nature, but the intent is sometimes difficult to determine for injuries such as burns. In the present Indian set up, most of the burn injuries are caused by domestic accidents, which are easily preventable provided proper prevention program directed at social and environmental changes and providing education to the people will help in inculcating the necessary lifestyle changes and thereby ensuring the safety of our people.

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Evaluation of Cardiovascular Autonomic Functions in Migraine Individuals

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Abstract

Introduction: A migraine is a multifactorial brain disorder characterized by recurrent disabling attacks of a headache and associated autonomic features affecting 20% of females and 6% of males. Neural explanation of migraine pathogenesis has revealed that the autonomic nervous system plays a pivotal role in the cascade of events leading to migraine.

Materials and Methods: This study evaluates the cardiovascular autonomic function tests in migraine individuals. The study was among 20-50 years of 30 healthy volunteers as a control group and 30 patients with migraine as study group. The standard autonomic cardiovascular function tests such as orthostatic standing test (OST), deep breathing (DB), isometric handgrip test (IHG), and cold pressor test (CP) were performed.

Results: There was a significant reduction in the modification of RR interval as evidenced by decrease in HR during the IHG and CP and also a significant decrease in the diastolic blood pressure when compared to the controls. The 30/15 ratio during OST test showed a statistically significant difference when compared to the controls. The E/I ratio was, however, was not statistically significant. All these suggest a sympathetic hypofunction.

Conclusion: These observations indicate a definite sympathetic hypofunction which might have activated the trigeminovascular system in causing a throbbing headache. An improved understanding of the role of sympathetic function in migraineurs may help to prevent and more effectively treat migraine and other headaches.

Key words: Autonomic function, Headache, Migraine, Sympathetic activity

INTRODUCTION

A migraine is a multifactorial brain disorder characterized by recurrent disabling attacks of a headache with autonomic features and with neurological aura symptoms. It is a ubiquitous familial disorder that begins in childhood, adolescence or in early adult life and runs with diminishing frequency during advancing years of age. WHO ranks migraine as one of the top 20 leading neurological causes of disability. It is estimated that 12% of world's

population suffer from migraine and in India, of 1200 million populations there are 150-200 million migraineurs under treatment. The gender prevalence of migraine is about 20% in females and 6% in males. In regards to work, migraine leads reduced productivity and absenteeism Campinha-Bacote.¹ Migraine is a heterogeneous disorder, where attacks vary in duration, frequency, severity, character and associated with physical and emotional disability. The anxiety and panic disorder have sympathetic overactivity with stress being the most important triggering factor. Migraine is also associated with ischemic stroke.² Neural explanation of migraine pathogenesis revealed that the autonomic nervous system (ANS) plays a pivotal role in the cascade of events leading to migraine attack. This study proceeds with testing migraine subjects by performing battery of tests on cardiac autonomic functions and finding the sympathetic or parasympathetic dysfunction in the heart and relate this with the pathogenesis of migraine.

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MATERIALS AND METHODS

A case-control study was done in tertiary care hospital, ethical clearance and Patient's informed consent was obtained. Patient's ages from 20 to 50 years were included in the study in both groups. The study group consists of newly diagnosed cases of migraine fulfilling International Headache Society (IHS) criteria for migraine were included in the study group. They were not on any medication for a headache and were screened for normal respiratory, cardiac, renal and hepatic functions. Patients with other causes of a headache such as cluster headache, tension headache, sinus headache and patients with hypertension, diabetes, ischemic heart disease, and neuromuscular disorder were excluded from the study. Nivique ambulatory digital electrocardiogram (ECG) recorder (INCO), pulse rate and NIBP recorder – PLANET-50, sphygmomanometer, handgrip dynamometer, and cold water filled basin were used for autonomic testing. The study subjects were asked to fill a pro forma to assess the severity of migraine and also ANS questionnaire to assess the autonomic dysfunction. 30 subjects in each group were subjected to a battery of autonomic function tests along with resting heart rate (HR) variability as described by Ewing *et al.*⁷ These tests examine the variability of HR at rest and its response to normal physiologic stimuli by various manoeuvres. The subjects tested during headache-free intervals between 10 and 12 AM, Any medication including caffeine, nicotine and alcohol and vigorous exercise should be avoided on the day of testing. The test should be performed in a quiet room with controlled temperature ranging from 25°C to 28°C and lighting subdued and mobile phones switched off. The subjects were instructed about various manoeuvres that would be employed and allowed to practice these manoeuvres. The subject was made to rest quietly, in the awake and supine position for a minimum period of ten minutes. After cleaning the site with spirit the exploring electrode one in the right shoulder and another in left shoulder and the reference electrode in right subcostal region was placed. Rest period was increased to 30 min and during this time ECG was acquired by continuous recording for 5 min (320 s) which is needed for short term ECG analysis. After screening for the artefact an editing it, the results were fed to HRV analysis software. The analogue to the digital conversion of the resting ECG signal was done using AD converter with a sampling frequency of 1024/s. Power spectral analysis of the converted ECG signal was done using fast Fourier transformation (FFT). Mean respiratory rate (RR), mean HR, total power, low frequency (LF), high frequency (HF), and LF/HF were estimated. A battery of tests proposed by Wang and Mishra (2006)¹⁶ was performed. Orthostatic standing test (OST) which tests both the sympathetic and parasympathetic reactivity of ANS and deep breathing (DB) which tests the intactness

of parasympathetic function were performed after giving enough rest in between the tests to the subjects. It was further proceed by doing isometric handgrip (IHG) test and cold pressor (CP) test for evaluating the sympathetic reactivity. The differences in autonomic functions in study and control group were assessed accordingly and evaluated using SPSS software version 11.0.1.

RESULTS

About 30 patients were recruited in each group, mean age of control group 33.27 ± 5.58 and mean age of case group 31.97 ± 8.20 . Female dominant in group, 24 in controls and 26 in cases group, which shown females are more prone to migraine. The mean body mass index of control and case group are 26.01 ± 1.26 and 25.84 ± 1.37 which is statistically insignificant ($P = 0.626$). Table 1 compares the resting HR, diastolic blood pressure (DBP) and systolic blood pressure (SBP), between the cases and controls. Mean value for HR and mean value of DBP between cases and control was not significant. However, the mean value of SBP showed a $P = 0.001$ which was highly significant. The mean value of HR, RR interval and total power were also not statistically significant ($P > 0.05$). Table 2 compares the resting HRV between cases and controls among parasympathetic dominant subjects. There was a statistically significant drop in LF and LF/HF ratio and an increase in HF in migraine patients when compared to controls. Table 3 compares the increase in HR above the resting value during the handgrip test in cases and controls. The P value was highly significant ($P = 0.001$). There was also an increase in DPB above the resting value during IHG test which was highly significant ($P = 0.010$). Table 4 compares the increase in HR and DPB above the resting value during CP Test in cases and controls. The P value was very highly significant ($P = 0.000$) for the increase in HR. The increase in DPB above the resting value during CP test was also highly significant ($P = 0.004$). Table 5 shows the comparison of parameters obtained in OST namely 30/15 ratio, SPB, DBP difference from the resting value in cases and control. The 30/15 ratio was highly significant ($P < 0.01$). The SBP and DBP changes during OSTs were also highly significant. Comparison of E/I ratio during DB between cases and control. The P value was not statistically significant ($P = 0.422$).

DISCUSSION

The ANS is strongly influenced by sympathetic and parasympathetic divisions. The extent of the control by these two limbs varies from individual to individual. In our study, the resting HR measurement signifies the autonomic tone at rest while, the cardiovascular response by stressors

Table 1: Comparison of all parameters of case and control subjects (n=30)

Parameters	Controls	Cases	P value**
HR/min	78.07±5.92	77.63±7.72	0.808
SBP mmHg	120.93±4.66	111.80±12.78	0.001
DBP mmHg	76.67±4.91	74.00±8.47	0.142
LF	44.13±10.03	40.76±15.23	0.316
HF	55.70±10.05	59.23±15.23	0.293
LF/HF	0.867±0.464	0.834±0.624	0.803
HR mean	78.17±7.07	76.79±10.80	0.562
RR mean	0.857±0.111	0.807±0.150	0.148
Total power	2538.80±1686.80	3019.97±9292.28	0.781

**Student's t-test. HR: Heart rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, LF: Low frequency, HF: High frequency, RR: Respiratory rate

Table 2: Comparison of HR variability between cases and controls among parasympathetic dominant subjects (n=22)

	Controls	Cases	P value
LF	38.94±4.13	33.67±9.74	0.027
HF	60.83±4.49	66.33±9.74	0.023
LF/HF	0.648±0.116	0.538±0.218	0.044

HR: Heart rate, LF: Low frequency, HF: High frequency

Table 3: Comparison of HR and DBP changes during isometric hand grip test between cases and controls

Vitals	Controls	Cases	P value
HR/min	12.20±1.69	8.33±5.43	0.001
DBP mmHg (1 min)	7.77±2.39	6.00±2.74	0.010

HR: Heart rate, DBP: Diastolic blood pressure, SD: Standard deviation

Table 4: Comparison of DBP changes during cold pressor test between cases and controls

Vitals	Controls	Cases	P value
HR/min	11.50±1.81	8.23±2.99	<0.0001
DBP mmHg (1 min)	9.07±2.00	7.17±2.87	0.004

HR: Heart rate, DBP: Diastolic blood pressure

Table 5: Orthostatic standing test: Comparison of 30/15 ratio, changes in SBP and DBP between cases and controls

Characteristics	Controls	Cases	P value
30/15 ratio	1.11±0.049	1.23±0.295	0.039
SBP mmHg	-2.83±5.58	7.47±4.63	0.001
DBP mmHg	3.80±3.37	-2.13±4.66	<0.0001

SBP: Systolic blood pressure, DBP: Diastolic blood pressure

which is essentially reflexive in nature, signifies the autonomic reactivity (Deepak *et al.*³). Spectral analysis applied to inter-beat interval (HR variability) has been considered as a useful parameter for determining ANS functions providing information on both sympathetic and parasympathetic functions. They give frequency specific contribution to

HR power spectrum which can be evaluated by FFT. The frequency domain analysis gives an idea of the LF and HF variables. LF is an index for sympathetic activity, which in this study was not statistically significant, but was less than the control group showing mild sympathetic hypofunction. On further analysis of the individual migraine subjects, 22 of the 30 subjects showed a parasympathetic dominance as reflected by the high HF and 8 of the subjects showed sympathetic dominance (with high LF). When these 22 subjects were compared with the controls, there was statistically significant difference between the spectra of migraine group and control group. The LF/HF ratio which is used to indicate the balance between the sympathetic and parasympathetic tone was significantly reduced in our study, quantifying the overall parasympathetic dominance. Mikamo *et al.*⁴ substantiated the sympathetic hypofunction by measuring the low concentration of norepinephrine levels among the migraineurs. However, in the time domain analysis, there was no significant change in mean HR and mean RR, when compared to the control groups. The autonomic reactivity was assessed in the study group by viewing the reflex response of the cardiovascular system to lab stressors like standing from supine position, undergoing hand grip exercise and by giving a painful stimulus by immersing the hand in cold water. The parasympathetic reactivity and sympathetic reactivity were separately tested by these stressors. In DB test which assesses the parasympathetic reactivity of ANS, there was no statistically significant difference in study and control groups. This reveals the intactness of parasympathetic function of ANS. In orthostatic hypotension test the parasympathetic component is functionally unaffected while the sympathetic division fails to bring back the blood pressure to normal. These findings suggest possible role of autonomic nervous involvement in pathogenesis of migraine. The result of this study was consistent with the study done by Havanka-Kanniainen *et al.*⁵ and Stephen, 2004. The study group also suffered from orthostatic intolerance as reflected from symptoms such as dizziness, lightheadedness, and unsteadiness. Cerebral hypoperfusion which was assessed by visual disturbances defined as flashes of light and fortification spectra was seen in five of the migraineurs revealing autonomic instability. The IHG test is a simple, non-invasive test. It measures the activity of peripheral sympathetic system acting through the efferent fibers supplying the heart and thus producing an increase in HR and blood pressure.⁶ This exercise reflex which withdraws parasympathetic and increases sympathetic activity failed to respond in our study group as evidenced by decrease in DPB and HR when compared to the controls. This was consistent with study done by Havanka-Kanniainen *et al.*,⁵ Mosek *et al.*,⁷ and Pogacnik *et al.*,⁸ which showed a smaller sympathetic activation in response to stressor. In CP test, another physiological stress test which assesses the efferent sympathetic outflow,

there was a statistically significant decrease in DPB and the failure to increase the HR. However, Rubin *et al.*⁹ found no significant difference between migraineurs and controls in response to CP test. Thus, the results of HR variability at rest showed a sympathetic hypofunction, and when the heart was given a challenge by the lab stressors, there was disturbance in the balance between the sympathetic and parasympathetic systems. This could lead to increased susceptibility to migraine headaches and also changes the system to reacts with the triggers at low threshold.¹⁰ The cause of sympathetic dysfunctional in migraineurs is due to decreased norepinephrine (NE) concentration leading to subsequent increase in the cotransmitters like dopamine (immediate precursor of NE) prostaglandins, neuropeptide Y and adenosine from the sympathetic neurons (Sherbourne *et al.*, 1992).^{11,12} The clinical symptoms of migraine can be linked to these cotransmitters. The symptoms like nausea and vomiting in migraineurs (7%) can be due to increase in excessive dopamine, throbbing headache (40%) can be due to the action of prostaglandins and the sedation in migraineurs (10%) can be associated with elevated levels of adenosine. Stress, an important provocation factor for migraine also contributes to the pathogenesis of migraine by depleting the NE. All these activate trigeminal system leading to throbbing headache of migraine. This well explains the therapeutic role of triptans and ergot alkaloids in treating headache by bringing about vasoconstriction thereby blocking the effects of the cotransmitters. This study would have been more valid if the NE levels were measured and the ANS activity was assessed by the cephalic vasomotor response. An understanding of the role of sympathetic functions and dysfunction in migraine may help to prevent or more effectively treat migraine and other headaches.

CONCLUSION

Evaluation of cardiovascular functions in migraine individuals reveals sympathetic hypofunction with an

intact parasympathetic activity as indicated by a significant reduction of sympathetic modulation of RR intervals in the study group. An increase in HF power (an indicator of parasympathetic activity) reveals a parasympathetic dominance. Pathogenesis of migraine may be attributed to a depletion of norepinephrine with a concomitant increase in cotransmitters leading to activation of the trigeminovascular system resulting in throbbing headaches. An improved understanding of the role of sympathetic function and its dysfunction may help to prevent or effectively treat migraine and other headaches.

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Clinical Spectrum and Epidemiological Profile of Patients Admitted to Pediatric Intensive Care Unit at a Tertiary Care Centre in South India

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Abstract

Introduction: The knowledge of clinical spectrum and epidemiological profile of critically ill children plays a significant role in the planning of health policies that would mitigate various factors related to the evolution of diseases prevalent in these sectors. The data collected enable prospective comparisons to be made with benchmark standards including regional and international units for the continuous pursuit of providing essential health care and improving the quality of patient care.

Purpose: To study the clinical spectrum and epidemiological profile of the critically ill children admitted to the pediatric intensive care unit at a tertiary care center in South India.

Materials and Methods: Descriptive data were collected retrospectively from the Hospital medical records between 2013 and 2016.

Results: A total of 1833 patients were analyzed during the 3-year period, of which 1166 (63.6%) were males and 667 (36.4%) were females. A mean duration of stay in pediatric intensive care unit (PICU) was 2.21 ± 1.90 days. Respiratory system was the most common system affected in our study 738 (40.2 %). Acute poisoning in children constituted 99 patients (5.4%). We observed a mortality rate of 1.96%, with no association with age or sex. The mortality rate was highest in infants below 1-year of age (50%). In our study, the leading systemic cause for both admission and death was the respiratory system.

Conclusion: This study analyses the epidemiological pattern of patients admitted to PICU in South India. We would also like to emphasize on public health prevention strategies and community health education which needs to be reinforced, especially in remote places and in rural India. This, in turn, would help in decreasing the cases of unknown bites, scorpion sting, poisoning and arthropod-borne illnesses, which are more prevalent in this part of the country.

Key words: Child, Female, India/epidemiology, Infant, Intensive care units, Male, Patient admission, Pediatrics, Retrospective study

INTRODUCTION

The care of critically ill children remains the most demanding and significant aspect in the field of pediatrics. Optimum care in the pediatric critical care unit depends on the level of training and expertise of the health-care

personnel, the availability of the resources, and evidence-based management protocols. The principal objective of pediatric critical care is not only to decrease the mortality but also to restore the child who is suffering from a life-threatening condition to health with a minimum of pain, anxiety, and complications and to provide comfort and guidance to the child's family.¹

In spite of the modern health-care facilities and several health programs rolled out by the governments and policy makers every year, the current global situation of the under-five mortality rate is alarming. About 5.9 million children under age five died in 2015,² i.e., 16,000 every day. These are the figures given by global health observatory data, WHO.

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Among the postneonatal deaths (1-59 months), pneumonia constituted 13%, diarrhea 9%, and malaria 5%.

By providing basic pediatric intensive care services such as intravenous access and fluid resuscitation, basic antibiotic support, oxygen and non-invasive ventilator support (continuous positive airway pressure) one can save the lives of million children every year in rural areas of developing countries. The main goal of pediatric intensive care unit (PICU) is to significantly decrease the mortality. These interventions are low cost and easy to implement in developing countries on a large scale to decrease mortality. The acquisition of technologies, training of human resources, and re-evaluation of care processes should be employed according to the demographic characteristics and morbidity of the population.

The knowledge of clinical spectrum and epidemiological profile of critically ill children plays a significant role in the planning of health policies that would mitigate various factors related to the evolution of diseases prevalent in these sectors. Descriptive epidemiology focuses on identifying and reporting the pattern and frequency of events related to the health of a population.³ This process also determines the general characteristics of disease under study and identifies the most vulnerable population subgroups.

Observational data guide the design of new protocols and clinical trials, which in turn helps in disease management and reduction of mortality. Regional disparities in the availability of resources, the quality of pediatric critical care services play a major role in the outcome of critically ill children. The data thus collected enable prospective comparisons to be made with benchmark standards and similar health-care units, including regional and international units, as well as within the same unit, for the continuous pursuit of providing essential health care and improving the quality of patient care.

With that, we set out to study the clinical profile of children admitted to pediatric critical care unit. The objective of this study was to report the clinical spectrum, epidemiological profile, and outcomes of critically ill children admitted to a pediatric critical care unit at a tertiary care center in South India.

MATERIALS AND METHODS

This retrospective study reviewed the admissions into the PICU of Sri Manakula Vinayagar Medical College and Hospital a tertiary care center in Puducherry, India, from March 2013 to April 2016. The hospital is a residency

training center that offers a concurrent educational program for residents in general pediatrics. The hospital operates a well-equipped six bed modern PICU, which admits pediatric patients ≤ 14 years of age, from both medical and surgical subspecialties. An assistance is provided by a multidisciplinary team of pediatric critical care physicians, nurses and nursing technicians, physical therapists, social workers, psychologists, dieticians, speech therapists, and doctors specialized in the field of pediatrics.

Ethical approval was waived by the Ethics Committee of the hospital as this is a retrospective observational study.

PICU records of all admissions, transfers out, discharges, and deaths were utilized for the purpose of this study. Our PICU admissions included patients who are critically ill but recoverable who need care other than that available in the general wards and post-surgical patients needing critical care. The following variables were included for analysis: Operating capacity (occupancy rate and number of beds), age, gender, reason for hospitalization (clinical, surgical or emergency), length of stay, and diagnosis. Outcome is classified as transfers to the main pediatric wards, discharges, discharges against medical advice, and death. For age analysis, we adopted the following stratification: <1 year, 1-5 years, 5-10 years, and >10 years. The analysis of the data was performed using Microsoft Office Excel version 2007 and statistical package for social science, version 17.0. Nominal data were compared using the χ^2 tests. $P < 0.05$ was considered significant.

RESULTS

Our PICU consists of 6 beds, A total of 1833 patients were analyzed during the 3-year period, of which 1166 (63.6%) were males and 667 (36.4%) were females, giving a male:female ratio of 1.74:1. Of the total patients admitted 921 (50.2%) were infants, patients aged 1-5 years were 508 (27.7%), age group of 5-10 years constituted 254 (13.9%), and patients aged >10 years to ≤ 14 years were 150 (8.2%). Table 1 elaborates the sex and age wise distribution of cases admitted in PICU. An average age of the patients admitted was 3.31 ± 3.69 years. The average age for males was 3.13 ± 3.60 and that for females was 3.61 ± 3.60 . The mean duration of stay in PICU was 2.21 ± 1.90 days ranging from 1 to 16 days. Table 2 shows the duration of stay in PICU.

Respiratory system was the most common system affected in our study 738 (40.2 %). Pneumonia was the most common diagnosis for patients with respiratory diseases. The three most common respiratory causes for hospitalization included bronchopneumonia, bronchiolitis, and hyperactive airway

disease. Infectious diseases constituted the next major chunk of cases that were admitted to our PICU 358 (19.5%). Infectious diseases majorly consisted of scrub typhus, sick dengue, complicated enteric fever, and malaria. It also included two cases each of staphylococcal scalded skin syndrome and Steven Johnson syndrome. The other major system involved in our study was central nervous system, 293 (15.9%). Febrile seizure, seizure disorder, and meningitis constituted most of the central nervous system (CNS) cases. Neurocysticercosis constituted a few cases of CNS.

Acute poisoning in children constituted 99 patients (5.4%) of all pediatric emergency admissions. It mainly consisted of accidental ingestion of household products and insecticides. Miscellaneous in Table 2 includes diabetic ketoacidosis, malignancy, electrocution, scorpion sting and unknown bites. It consisted of 71 (3.87%) cases. Table 3 highlights the number of patients admitted with major system involvement in different age groups.

Regarding the clinical outcome, 1647 (89.85%) patients improved, were transferred to the pediatric, and were eventually discharged; 36 (1.96%) patients died; 150 (8.18%) left against medical advice. We observed a mortality rate of 1.96%, with no association with age or sex. The average and median ages of the deceased patients were 2.92 ± 3.16 standard deviation (SD) and 1.5 years, respectively; males

had an average age of 2.91 ± 3.45 SD and females had an average age of 2.93 ± 2.87 SD. Tables 4 and 5 elaborate the number of mortality in various age groups and systems, respectively. The average length of stay (LOS) for the deceased patients was 3.33 ± 2.85 days. A mortality rate was highest in infants below 1-year of age (50%). In our study, the leading systemic cause for both admission and death was the respiratory system.

DISCUSSION

This study revealed that respiratory, infectious diseases and neurological diseases were the major causes of admission to the PICU of the tertiary care center studied. It was similar to that reported by Lanetzki *et al.*,³ also respiratory diseases were the most common reason for hospitalization among patients in PICC at HIAE reported by Draper *et al.*⁴ However, cardiovascular disease entity as the most common (41.1%) cause of admission to PICU was reported by Abhulimhen-Iyoha *et al.*⁵ The less number of patients admitted with cardiovascular complaints is justified by the fact that we lack a full-fledged cardiovascular and cardiothoracic surgery unit in our center.

Children less than 1-year of age were the most vulnerable group, who presented to the emergency department

Table 1: Sex and age wise distribution of the study group

Age	<1 year	>1 to <5 years	>5 to <10 years	>10 to <14 years	Total
Male	608	318	154	86	1166 (63.6)
Female	313	190	100	64	667 (36.4)
Total (%)	921 (50.2)	508 (27.7)	254 (13.9)	150 (8.2)	1833

Table 2: Duration of stay in the PICU

Duration of stay (days)	<1 year	>1 to <5 years	>5 to <10 years	>10 to <14 years	Total (%)
1	480	286	130	83	979 (53.4)
2-5	374	195	107	60	736 (40.2)
6-10	58	24	16	6	104 (5.7)
>10	9	3	1	1	14 (0.8)

PICU: Pediatric intensive care unit

Table 3: System wise distribution of the patients admitted in PICU

System	≤1 year	>1 to ≤5 years	>5 to ≤10 years	>10 to ≤14 years	Total (%)
Respiratory	506	128	69	35	738 (40.2)
Infections	144	99	64	51	358 (19.5)
CNS	118	121	36	18	293 (16)
GIT	72	62	32	15	181 (9.9)
Genitourinary	8	15	28	11	62 (3.4)
Poisoning	32	50	12	5	99 (5.4)
Surgery	11	7	1	7	26 (1.4)
Orthopedics	4	1	0	0	5 (0.3)
Miscellaneous	26	25	12	8	71 (3.9)

GIT: Gastrointestinal tract, CNS: Central nervous system

Table 4: Sex and age wise distribution of the deceased cases

Age	≤1 year	>1 to ≤5 years	>5 to ≤10 years	>10 to ≤14 years	Total
Male	10	6	3	1	20
Female	8	5	3	0	16
Total	18	11	6	1	36

Table 5: System wise distribution of the deceased cases

System	≤1 year	>1 to ≤5 years	>5 to ≤10 years	>10 to ≤14 years	Total (%)
Respiratory	14	6	0	0	20 (55.55)
GIT	2	2	1	0	5 (13.8)
Infections	1	2	3	0	6 (16.6)
CNS	0	1	1	1	3 (8.3)
Genitourinary	1	0	1	0	2 (5.55)
Total	18	11	6	1	36

GIT: Gastrointestinal tract, CNS: Central nervous system

requiring admission to the PICU 921 (50.2%), this was similar to that reported by Rady,⁶ Einloft *et al.*⁷ (40%), and Lanetzki *et al.*³ In our study, males constituted 63% of admission (1166), it was similar to that reported by Batista *et al.*⁸ (56%) and Einloft *et al.*⁷ (58%).

In this study, the mean duration of stay in PICU was found to be 2.21 ± 1.90 days. In a study conducted in Brazil by Batista *et al.*,⁸ LOS in PICU was 6.9 ± 5.5 days, whereas in a study conducted in Israel by Lanetzki *et al.*³ LOS was 9.7 days. Although some studies reveal that there is correlation between LOS and outcome of pediatric patients,⁹ others show no relationship.¹⁰ In this study, there was no significant relationship between LOS and outcome as was documented by Patil¹⁰ in the year 2012.

In contrast to the general and polytrauma cases reported by Abhulimhen-Iyoha *et al.*⁵ and Batista *et al.*,⁸ we hardly had any cases of trauma. Furthermore, in contrast to Lanetzki *et al.*³ Abhulimhen-Iyoha *et al.*⁵ and Batista *et al.*,⁸ we had a significant number of cases of poisoning 99 (5.4%), scorpion sting and unknown bites. The above findings in our study could be attributed to the fact that the majority of the patients the center caters to belong to rural population and remote places of South India.

We found that the mortality was the highest below 1-year of age (50%) and it was similar to that reported by Rady⁶ (43.9%) and Batista *et al.*⁸ (44.7%). The observed mortality rate in our study was low (1.96%). This observation was in contrast to that reported by Abebe *et al.*¹¹ (40%) and Batista *et al.*⁸ (15.6%). We found that our observations were comparable to the mortality reported by a study in Israel, Lanetzki *et al.*³ (1.87%) and in India, Abhulimhen-Iyoha *et al.*⁵ (2.1%). Important factors that may have contributed to survival in these patients include adequate manpower, equipment, and provision

of continuous medical education in pediatric critical care from time to time for staff by the institution.

Some patients remained in the unit for as long as 16 days either because they required critical care for the period or for logistic reasons, i.e., lack of a step-down ICU or no bed space at main pediatric wards to enable their transfer. Because of the lack of a step-down unit in our center, many of the patients who although were not critically ill but still required some monitoring were admitted in PICU. This resulted in full recovery of some patients in PICU resulting in their discharge home directly from the ICU. This, in turn, resulted in an improper use of the resources and added the burden on the caregivers in the ICU.

CONCLUSION

This study analyses the epidemiological pattern of patients admitted to PICU in South India. This can serve as the basis for developing dedicated and new protocols for the caregivers in an effort to improve the outcome of critical illness. It would also enhance the cost effectiveness.

The study also stresses on the need for a step-down unit and redistribution of resources to cater for the needs of patients not ill enough to require ICU admission. This not only reduces the burden on the intensive care personnel but also significantly reduces the economic burden on the patients.

We would also like to emphasize on public health prevention strategies and community health education which needs to be reinforced, especially in remote places and in rural India. This, in turn, would help in decreasing the cases of unknown bites, scorpion sting, poisoning and arthropod-borne illnesses, which are more prevalent in this part of the country.

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Metastatic Lymphadenopathy by Fine-needle Aspiration Cytology

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Abstract

Introduction: Fine-needle aspiration cytology (FNAC) plays an undeniably important role in the diagnostic approach to lymphadenopathy. Our aim was to study the distribution and cytomorphology of metastatic lymphadenopathy and understand the approach to diagnosis.

Materials and Methods: This was retrospective study including all cases of lymph nodes involved by metastatic malignancy which was referred for FNAC over a period of 1-year.

Results: During the study period, 104 (4.8%), out of total 2140, lymph nodes aspirated showed evidence of metastatic malignancy. The age of the patients ranged from 19 to 90 years with the mean age being 55.8%. Male to female ratio was 1.8:1. The submandibular lymph nodes were the most commonly involved, 35 cases (33.6%) and closely followed by anterior cervical nodes 33 cases (31.7%). The most common primary site of malignancy was the oral cavity, and squamous cell carcinoma was the most commonly detected malignancy. Poorly differentiated epithelial malignancy was reported in 18 cases (17.3%).

Conclusion: Lymphadenopathy due to metastatic malignancy can be efficiently diagnosed by FNAC using a systematic approach combined with clinical information. Such an approach should be based on the characteristics of lymphadenopathy and the cytomorphology.

Key words: Fine-needle aspiration cytology, Lymphadenopathy, Metastasis

INTRODUCTION

Lymphadenopathy is a common clinical presentation which must be investigated thoroughly. It could be regional or generalized, and is seen in various benign and malignant conditions. To diagnose the cause of lymphadenopathy different diagnostic modalities are used, which include fine-needle aspiration cytology (FNAC), flow cytometry, radiologically guided core needle biopsy, and open biopsy. Among these FNAC is the cheaper, safer and faster technique for diagnosing the type of lymphadenopathy with a high degree of accuracy. FNAC also helps to

diagnose metastases or recurrences in cases of known primary malignancies. It also plays a role in identifying an unknown primary tumor. Since FNAC is a minimally invasive procedure and can be performed in an outpatient department, FNAC also serves as an ideal follow-up tool.

The aim was to study the distribution and cytomorphology of lymph node metastases.

MATERIALS AND METHODS

This study included 104 cases of lymph nodes involved by metastatic malignancy which were referred for FNAC to Pathology Department of our institute over a period of 1-year. In 10 cases, ultrasonography (USG)-guided FNAC was performed and smears were sent with clinical details of the respective patients for cytological evaluation.

In all cases, a thorough evaluation was done and clinical details including history, physical examination, and

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laboratory studies were recorded. Findings of chest radiography, computed tomographic scans, USG, and mammography in women were duly recorded wherever available. The patients were explained about the procedure and an informed consent was taken.

Fine-needle aspiration was performed with disposable equipment, a 22-gauge, 1" needle attached to a 5 cc disposable syringe. Two or three separate passes were made for adequate sampling. The samples were ejected onto glass slides, evenly spread, fixed immediately in 95% alcohol, and stained with the Papanicolaou stain.

Slides were screened and those positive for malignant cells were further typed based on cytomorphology as metastasis of squamous cell carcinoma (SCC), adenocarcinoma, and other distinctive tumor types.

Those cases which showed features of malignancy but could not be placed into any definite group were reported as per their predominant cytomorphology. Inadequate smears were excluded from the study.

RESULTS

This study was a retrospective analysis of cases diagnosed over a period of 1-year. During this period, 104 (4.8%), out of total 2140, lymph nodes showed evidence of metastatic malignancy and were included in this study.

The age of the patients ranged from 19 to 90 years, with males 68 (65.4%) and females 36 (34.6%). The lymph node metastases were the most common in the age range of 45-54 years with the mean age being 55.8 years.

In 54 (51.9%) cases, the lymph node to be aspirated was the presenting symptom. Other common symptoms were dysphagia, change in voice, loss of appetite, and weight loss. The symptoms varied with the site of primary malignancy.

The submandibular lymph nodes were the most commonly involved nodes (Table 1), 35 cases (33.6%). This was closely followed by anterior cervical nodes 33 cases (31.7%) and supraclavicular nodes were involved in 13 cases (12.5%).

The size of the involved lymph nodes ranged from 0.5 to 7 cm in largest dimension. The majority of them, 37 (35.5%), were in the size range of 1.5-2.4 cm.

The most common primary site of malignancy was the oral cavity (Table 1), followed by larynx, hypopharynx, and oropharynx. In females, apart from these, primary in the breast was also common. Metastasis of SCC was most commonly reported (Table 2), 69 cases (66.3%), followed by

adenocarcinoma metastasis in 6 cases (5.7%) and metastasis of infiltrating duct carcinoma was seen in 4 cases (3.8%). SCC was the most common metastatic malignancy detected in submandibular (27 cases), anterior cervical (24 cases), posterior triangle (7 cases), and submental (2 cases) nodes (Table 3). The cases, where cytological features, were not typical of any particular malignancy; they were included in poorly differentiated epithelial malignancy (18 cases) and papillary epithelial malignancy (2 cases) (Figures 1-5).

DISCUSSION

Lymph nodes are the most common site of metastatic malignancies and sometimes, constitute the first clinical manifestation of the disease.

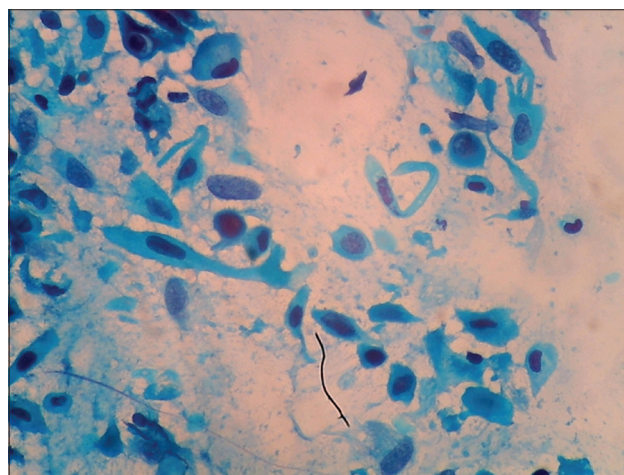


Figure 1: Metastases of squamous cell carcinoma (Papanicolaou, x400) show malignant squamous cells in clusters and scattered singly with hyperchromatic nuclei and cytoplasm which is cyanophilic. Few cells with bipolar and unipolar cytoplasmic extensions are also seen. Background shows necrosis

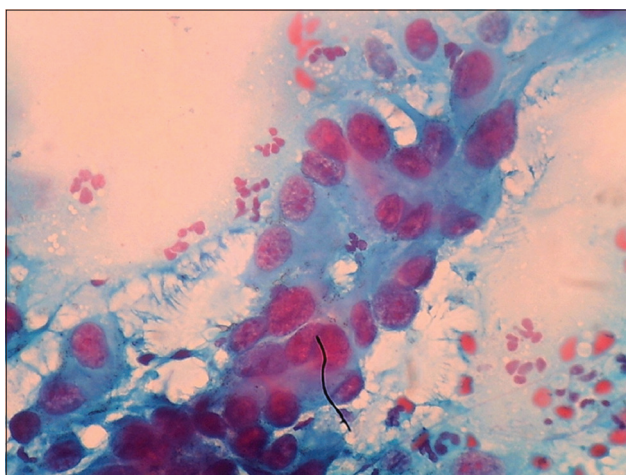


Figure 2: Metastasis of adenocarcinoma (Papanicolaou, x400): Tumor cells in glandular arrangement with vesicular nuclei, conspicuous nucleoli and moderate amount of cytoplasm

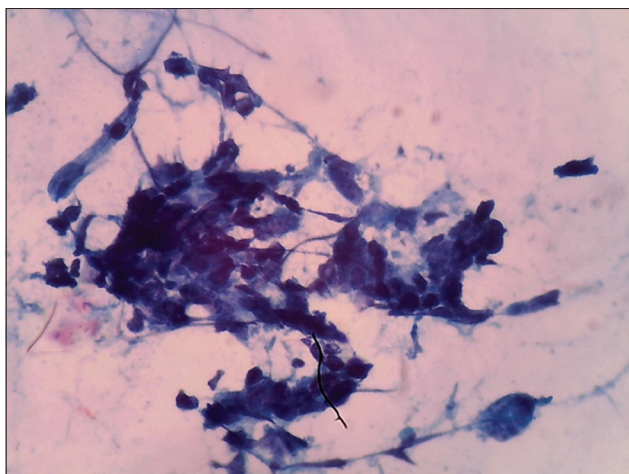
Table 1: Distribution of primary malignancies in lymph node groups

Primary sites	Distribution of metastatic lymph nodes							Periportal	Total
	Submandibular	Anterior cervical	Supraclavicular	Posterior triangle	Inguinal	Sub-mental	Axillary		
Oral cavity	13	6	2	1	0	2	0	0	24
Larynx	6	4	0	1	0	0	0	0	11
Hypopharynx	2	2	1	0	0	0	0	0	5
Breast	0	1	2	1	0	0	1	0	5
Oropharynx	1	2	0	1	0	0	0	0	4
Skin	0	1	1	0	1	0	0	0	3
GIT	1	1	1	0	0	0	0	1	4
Penis	0	0	0	0	3	0	0	0	3
Lung	1	0	1	0	0	0	0	0	2
Bladder	0	0	1	0	1	0	0	0	2
Ovary	0	0	0	0	1	0	0	0	1
Thyroid	0	0	1	0	0	0	0	0	1
Kidney	0	0	0	0	1	0	0	0	1
Salivary gland	1	0	0	0	0	0	0	0	1
Unknown	10	16	3	6	1	0	1	0	37
Total	35	33	13	10	8	2	2	1	104

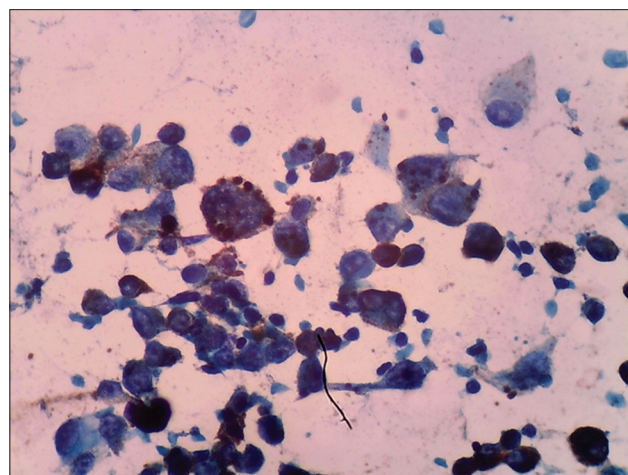
GIT: Gastrointestinal tract

Table 2: Distribution of metastasis according to cytological diagnosis

Type of malignancy	Number
Squamous cell carcinoma	69
Adenocarcinoma	6
Infiltrating duct carcinoma	4
Mucoepidermoid carcinoma	2
Papillary carcinoma thyroid	1
Melanoma	1
Malignant germ cell tumor	1
Poorly differentiated epithelial malignancy	18
Papillary epithelial malignancy	2
Total	104

**Figure 3: Metastasis of poorly differentiated epithelial malignancy (Papanicolaou, x400) showing cells in loose clusters with marked nuclear hyperchromasia and anisonucleosis**

In our study of 1-year duration, 4.8% cases of metastatic lymphadenopathy were diagnosed which is similar to few reports but considerably lower than other studies (Table 4).

**Figure 4: Metastasis of malignant melanoma (Papanicolaou, x400) with dispersed single cells, eccentrically placed nuclei, few were binucleated with prominent nucleoli and cytoplasm showing melanin pigment**

This variation originates largely from the type of services and clinical expertise in oncological management provided by the place of study as well as the socioeconomic status of the patients.

Male to female ratio was 1.8:1. Male predominance was seen consistently in most of the Indian studies. This has been attributed to the use of tobacco, alcohol, etc., which is more prevalent in the male population.

The majority of cases, in our study, were in the age range of 45-54 years with the mean age being 55.8 years, which is consistent with other studies. However, with increasing consumption of tobacco (in various forms), paan and areca nut, the younger age group is also being affected. There were 23 patients below 45 years in our study.

Table 3: Distribution of metastases in lymph node groups

Type of malignancies	Sub-mandibular	Anterior cervical	Supraclavicular	Posterior triangle	Inguinal	Sub-mental	Axillary	Periportal	Total
Squamous cell carcinoma	27	24	6	7	3	2	0	0	69
Adenocarcinoma	2	2	2	0	0	0	0	0	6
Infiltrating duct carcinoma	0	1	1	1	0	0	1	0	4
Mucoepidermoid	2	0	0	0	0	0	0	0	2
Papillary carcinoma thyroid	0	0	1	0	0	0	0	0	1
Melanoma	0	0	0	0	1	0	0	0	1
Malignant germ cell tumor	0	0	0	0	1	0	0	0	1
Poorly differentiated epithelial malignancy	4	5	3	1	3	0	1	1	18
Papillary epithelial malignancy	0	1	0	1	0	0	0	0	2
Total	35	33	13	10	8	2	2	1	104

Table 4: Different studies and their corresponding findings

Author	Frequency of metastatic lymph nodes	Age predominance	Gender predominance	Common site of lymphadenopathy	Common site of primary malignancy	Common type of malignancy
Fatima <i>et al.</i> ¹	8.7	50-60	-	-	-	SCC
Ghartimagar <i>et al.</i> ²	18	Mean 60.4	-	Anterior and posterior triangle cervical	Lung	Adeno-carcinoma
Rathod and Shah ³	-	>40	Male	Cervical	-	SCC
Qadri <i>et al.</i> ⁴	38.2	-	Male	-	-	SCC
Patel <i>et al.</i> ⁵	27.06	41-50	Male	Cervical	-	SCC
Sheikh and Parmar ⁶	26.4	41-60	Male	Cervical	Oral cavity, pharynx, larynx	SCC
Qadri <i>et al.</i> ⁷	31.4	Mean 52.5	Male	Supraclavicular	Oesophagus	SCC
Pavithra and Geetha ⁸	20.06	-	--	Cervical	-	SCC
Yadav <i>et al.</i> ⁹	14.6	40-60	Male	Cervical	-	SCC
Mehdi <i>et al.</i> ¹⁰	-	51-60	Male	Cervical	Larynx, tongue	SCC
Rathod and Singla ¹¹	20.46	-	-	Cervical	Oral cavity	SCC
Anila <i>et al.</i> ¹²	48.2	50-80	-	Cervical	Head and neck	SCC
Sharma <i>et al.</i> ¹³	6.38	-	-	Cervical	-	SCC
Present study	4.8	45-54	Male	Submandibular	Oral cavity	SCC

SCC: Squamous cell carcinoma

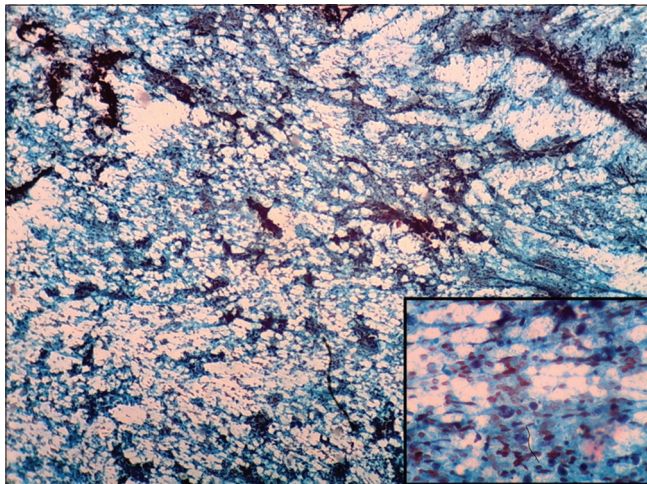


Figure 5: Metastasis of malignant germ cell neoplasm (Papanicolaou, ×100) showing dispersed large cells with macronucleoli and moderate amount of cytoplasm in a tigroid background with abundant lymphocytes. Inset showing the large cells with macronucleoli

The presenting symptom varied in different studies but palpable lymph node enlargement¹⁴ and weight loss were at the top of the list, similar to our observations. However, pleural and pulmonary metastases were common in the study by Didolkar *et al.*¹⁵

In this study, submandibular nodes 35 (33.6%) were the most commonly involved group followed closely by the anterior cervical group 33 cases (31.7%). SCC was the most common malignancy in these groups.

The groups of lymph nodes with the most diverse set of primaries were supraclavicular and inguinal nodes. Supraclavicular nodes were involved in 13 cases (12.5%) and apart from aerodigestive tract, received metastases from lung, breast, thyroid and bladder, while inguinal nodes were involved in carcinoma penis, bladder, kidney, ovary, melanoma of right lower limb and germ cell neoplasm from unknown primary. Ahmad *et al.*¹⁶ and

Sinha *et al.*¹⁷ have observed that lung is the most common primary for metastases to supraclavicular nodes, along with colorectum and breast. As for the Inguinal nodes, malignant lesions arising in the lower extremity, perineum, male and female genital tracts have been reported to be important primary sites by Copeland and McBride¹⁴ and Ahmad *et al.*¹⁶

SCC was the most common malignancy diagnosed in this study and was observed in 66.3% cases. This is consistent with most studies; however, Ghartimagar *et al.*² and Didolkar *et al.*¹⁵ have found adenocarcinoma to be the most common metastatic malignancy. This can be attributed to various geographic, demographic and lifestyle factors.

Adenocarcinoma was detected in 6 (5.7%) cases in this study. The primaries were from lung in 2 cases, from esophagogastric junction (1 case), rectum (1 case) and 2 were unknown. Infiltrating duct carcinoma was found in 4 cases (3.8%) and all were known cases of breast carcinoma. In only 1 case, axillary lymph node was involved. In rest of the cases metastasis was detected in posterior cervical, supraclavicular and anterior cervical nodes.

Poorly differentiated epithelial malignancy was reported in 18 cases (17.3%) when the features were not typical of any of the malignancies. In 2 cases, the tumor cells were arranged in papillary clusters with fibrovascular cores and lacked any characteristic microscopic features. Histopathological correlation was not performed because tissue diagnosis was not sought for the majority of the patients.

On the other hand, the cytology of primary malignancy could be determined in 26 out of 37 (35.5%) cases in which primary was not known or suspected. These included SCC (59.4%), adenocarcinoma in 5.4%, 1 (2.7%) case of mucoepidermoid carcinoma, and 1 (2.7%) case of malignant germ cell tumor. Remaining were poorly differentiated epithelial malignancy in 9 (24.3%) cases and papillary epithelial malignancy in 2 (5.4%) cases. These findings are consistent with those in the study of efficacy of aspiration cytology by Prasad and Mohan,¹⁸ where primary was not known in 37.3% cases and a cytological diagnosis of SCC was given in 12.7% cases, adenocarcinoma in 32.4% cases, and poorly differentiated carcinoma was given in 54.9% cases.

CONCLUSION

Lymphadenopathy due to metastatic malignancy can be efficiently diagnosed by FNAC using a systematic approach combined with clinical information. Such an approach should be based on the characteristics of lymphadenopathy and the cytomorphology. FNAC is cheap, non-invasive and is preferable for the patient. However, wherever it is required, tissue diagnosis must be performed.

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Laryngeal Biopsies with Special Reference to Malignant Tumors: A Histopathological Study

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Abstract

Introduction: Larynx serves us with three functions such as protective, respiratory, and phonatory. There are many risk factors which affect larynx and cause various disorders. Malignancy can develop in any part of the larynx, but the cure rate depends on the location of the tumor. The aim of the present study is to study the spectrum of lesions seen in the laryngeal biopsies received and to study the different histological types of malignant tumors.

Materials and Methods: A total of 95 patients were included in this study. From all the chronic cases, biopsy was obtained to classify the type of the disease histologically and also the aim of biopsy study requested by clinician was to rule to rule out malignancy. Biopsy procedure was done in operation theater by E.N.T surgeon. The biopsy sections were stained with routine hematoxylin and eosin stains and examined.

Results: Out of 95 laryngeal biopsies, 25 biopsies from inflamed larynx, 49 from neoplastic growths, 8 from laryngeal nodules, 2 from laryngoceles, 2 showed no significant lesions, 1 from the infected cyst, and 8 were inadequate biopsies. Out of 41 malignant tumors, 39 were squamous cell carcinoma, basaloid squamous type and adenocarcinoma were one each. A highest number of malignant tumors were seen between 41 and 60 years.

Conclusion: In recent days, pre-operative biopsy procedures give good results because of fiber optic endoscopic assisted biopsies, help to confirm malignancy, and also help to differentiate the tumors. Accurate diagnosis with biopsy on clinical suspicious lesions will help to treat patients early and promptly. Health education in communities in relation to tobacco usage will help to reduce the incidence of malignant tumors.

Key words: Biopsy, Histopathology, Larynx, Malignant tumors

INTRODUCTION

The larynx is a respiratory organ situated in the respiratory tract in between pharynx and trachea. The cavity is lined by mucous membrane; hence, various lesions ranging from acute non-infective laryngitis to various malignancies can be seen. Larynx serves us with three functions such as protective, respiratory, and phonatory.^{1,2}

There are many risk factors which affect larynx and cause various disorders. These include vocal abuse or overuse,

which may cause vocal cord nodules, polyps, or laryngitis. Smoking and drinking can cause laryngeal cancer. Traumas or neurological conditions may cause vocal cord paralysis as well as swallowing difficulties (dysphagia). Other disorders are contacted ulcers, laryngoceles, and spasmodic dysphonia.

For proper diagnosis of laryngeal lesions, various diagnostic aids such as X-ray examination, computed tomography, magnetic resonance imaging, and ultrasonography have become widely available. These powerful methods have proved useful in supplementing, clinical determination of the size, and extent of laryngeal tumors.

However, to distinguish malignancy from the panoply of disorders that may have a similar gross appearance such as fungal, mycobacterial infections, syphilitic gummas, idiopathic granulomatous disorders, benign neoplasms, a tissue diagnosis must be made. The accepted standard for

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diagnosis is histopathologic examination of tissue obtained at laryngoscopy of biopsy.^{3,4}

Hence, the role of biopsy is indispensable in diagnosing malignant tumors, which are more commonly seen and also useful to identify the different types of tumors. Biopsy is also important clinically, which is often neglected; the degree of differentiation is significant.⁵

Squamous cell carcinoma (SCC), the most common malignant tumor about 95% seen in larynx, is habit oriented, preventable, and curable. In diagnosing such tumors, histopathological examination is of immense help. Malignancy can develop in any part of the larynx, but the cure rate depends on the location of the tumor. There is an increase in death toll rate from 76,000 deaths in 1990 to 88,000 deaths in 2012.⁶ In the United States, 60% of five survival rates were reported.⁷

The aim of the present study is to study the spectrum of lesions seen in the laryngeal biopsies received and to study the different histological types of malignant tumors.

MATERIALS AND METHODS

The present study, which is prospective, based on study of laryngeal biopsies received in the Department of Pathology, Government Medical College, Ananthapuramu, for 2 years.

A total number of 95 patients were selected and included in this study for laryngeal biopsies. Patients were explained about the procedure and benefit due to biopsy report when they agree for biopsy informed consent has taken. Before doing this study, institutional approval from Ethical Committee was obtained.

All chronic cases presenting with complaints of hoarseness of voice, dyspnea, dysphagia, pain, and stridor irrespective of the lesion present in the larynx were included in this study. There were no specific complaints related to any of the lesions of larynx.

The lesions located in the anterior aspect of epiglottis, oropharynx, and pyriform fossa were excluded in this study.

From all the chronic cases, biopsy was obtained to classify the type of the disease histologically and also aim of biopsy study requested by clinician was to rule out malignancy. Biopsy procedure was done in operation theater by E.N.T surgeon.

The material thus obtained was immediately preserved in 10% neutral formalin and sent to the department of pathology. The tissue obtained was fixed in 10% neutral

formalin for 24 h in the department of pathology after verifying the particulars of the patient. After 24 h, the tissue was processed for histopathological study. The tissue sections were processed using histokinette and embedded in paraffin wax. Serial sections were taken from paraffin blocks using rotary microtome of 4-6 μ thick. The sections were stained with routine hematoxylin and eosin stains. Special stain-like Giemsa was used whenever needed. All the results were entered into excel sheet and analyzed.

An attempt was made in the present study to classify the laryngeal diseases, histologically from the biopsy tissue obtained from chronic cases of laryngeal problems.

Statistical analysis was done using danielSoper.com by calculating Chi-square and degree of freedom for analyzing *P* value. The *P* < 0.001 was considered significant.

RESULTS

A total number of surgical biopsies received during 2 years were 6898. Of these, laryngeal biopsies formed were 95 (1.37%). Out of 95 laryngeal biopsies, 25 biopsies from inflamed larynx, 49 from neoplastic growths, 8 from laryngeal nodules, 2 from laryngoceles, 2 showed no significant lesions, 1 from infected cyst, and 8 were inadequate biopsies (Table 1).

Microscopic examination of 23 cases of chronic non-specific laryngitis showed stratified squamous epithelium, showing parakeratosis, acanthosis. Subepithelially congested blood vessels chronic inflammatory cells formed by lymphocytes plasma cells and fibroblasts (Figures 1 and 2).

Table 1: The histological findings of biopsies received from 95 cases

Lesion	Number of biopsies received (%)
Inflammatory lesions	25 (26.3)
Chronic non-specific laryngitis	23 (24.2)
Tuberculosis of larynx	1 (1.1)
Scleroma larynx	1 (1.1)
Benign mucosal disorders	11 (11.6)
Vocal nodules	8 (8.4)
Laryngoceles	2 (2.1)
Non-specific infected cyst	1 (1.1)
Benign tumors	8 (8.4)
Squamous papillomas	7 (7.4)
Hemangioma	1 (1.1)
Malignant tumors	41 (43.2)
Squamous cell carcinoma	39 (41.1)
Basaloid squamous cell carcinoma	1 (1.1)
Adenocarcinoma	1 (1.1)
Normal cord	2 (2.1)
Inadequate biopsies	8 (8.4)
Total	95 (100)

Microscopy of tuberculosis (TB) of the larynx showed stratified squamous epithelium. Subepithelially well-defined granulomas were seen granulomas were made up of central caseous necrosis surrounded by epithelial cells, Langhans type of giant cells, and peripheral mantle of lymphocytes and fibroblasts.

Microscopy of scleroma larynx showed stratified squamous epithelium. Subepithelially Mikulicz cells, plasma cells, and Russell bodies were seen. Giemsa demonstrated *Klebsiella rhinoscleromatis* organisms within the Mikulicz cells.

Laryngeal nodules histologically showed stratified squamous epithelium. Subepithelially dilated vascular channels, along with chronic inflammatory cell infiltrate was seen.

Laryngocele histologically showed a cyst wall lined by pseudostratified columnar epithelium. Subepithelially inflammatory cell infiltrate.

Squamous papilloma showed stratified squamous epithelium with acanthosis, papillomatosis of varying degree and a fibrovascular core (Figure 3).

Hemangioma histologically showed stratified squamous epithelium. Subepithelially vascular channels of various sizes filled with blood (Figure 4).

Out of 95 laryngeal biopsies, 41 (43.2%) malignant tumors noticed, which is the predominant one. Out of 41 malignant tumors, 39 were SCC, basaloid squamous type and adenocarcinoma were one each. Highest number of malignant tumors were seen between 41 and 60 years (Table 2).

There is male preponderance in malignant tumors when compared to females. Males were 36 (87.8%) and females were 5 (12.1%), and the ratio is 7.2:1. Among 36 males, 34 (94.4%) were smokers. Smoking and male variables in relation to malignant tumors were statistically significant and the $P < 0.001$.

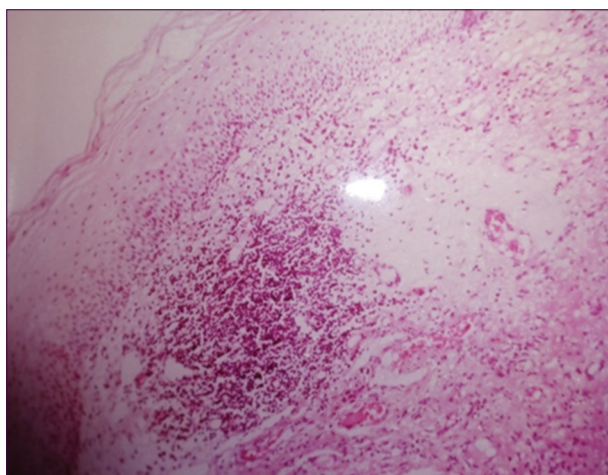


Figure 1: Chronic non specific laryngitis

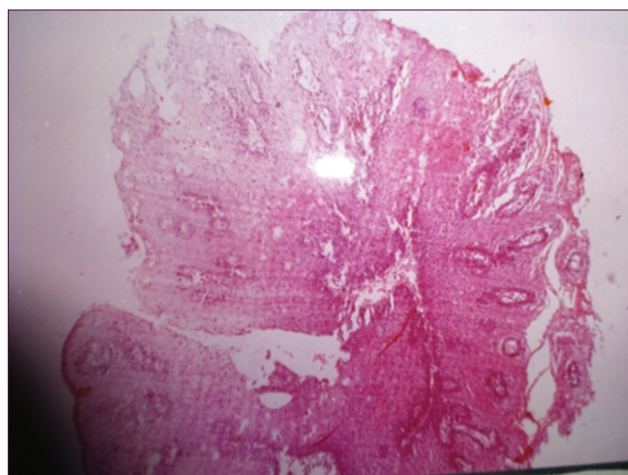


Figure 3: Squamous papilloma of larynx

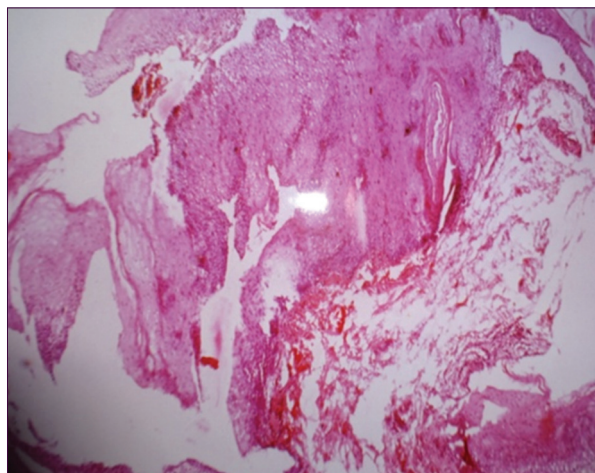


Figure 2: Chronic hypertrophic laryngitis

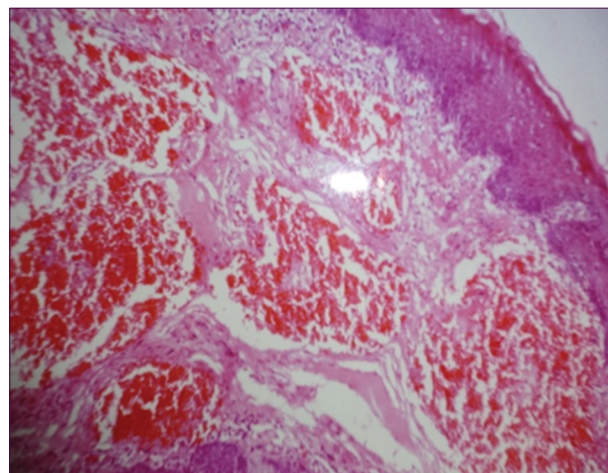


Figure 4: Haemangioma of larynx

Most frequent site for occurrence of malignant tumors is glottis followed by Supraglottis (Table 3).

Histological picture of SCC showed tumors consisting of irregular masses of squamous cells (Figures 5 and 6). The invading tumor masses were composed of varying proportions of normal squamous cells and atypical squamous cells. The majority of the tumors were Grade II (Table 4).

DISCUSSION

Acute laryngitis is infective or non-infective etiology should diagnose clinically and using other diagnostic aids, but not biopsy where it is contraindicated. Any chronic non-specific inflammatory reaction of laryngeal mucosa may be called chronic laryngitis.

Hoarseness presenting for more than 2 months demands specialist attention,⁸ whereas biopsy forms the cornerstone of an appropriate workup. In the present study, 23 laryngeal biopsies were reported as non-specific laryngitis, and all patients were presented with hoarseness of voice.

In the present study, peak incidence of laryngeal lesions was shown in between 41 and 60 years, which coincides with

Brock's observation.⁹ Most of the members (91.3%) in this study were smokers, and many studies were also noticed strong association of chronic non-specific laryngitis with tobacco smoking.^{10,11}

In this study, dysplasia of Grade II was seen in only one biopsy. The relation between chronic laryngitis and the malignant transformation of such larynx is well known since 1923.¹²⁻¹⁴ Proper follow-up provides greater information about the fate of such larynx.

In the present study, one case of TB larynx was noted in posterior part of vocal cord of a 60 years male patient. Tuli *et al.* noticed TB larynx at posterior part of true vocal cord, the arytenoid cartilage and inter arytenoid space.¹⁵

Scleroma of the larynx is usually associated with nasal scleroma,¹⁶ but several publications have discussed the involvement of larynx, trachea, and bronchi.¹⁷ The larynx being involved in 15-80% and the tracheobronchial tree in 2-20% of patients with rhinoscleroma.¹⁸ Only two cases of

Table 2: Age-wise distribution of malignant tumors of larynx

Age in years	Number of malignant tumors (%)
0-20	Nil
21-40	9 (21.9)
41-60	25 (60.9)
61 and above	7 (17.07)
Total	41 (100)

Table 3: Subsite distribution of malignant tumors of larynx

Site	Number of cases (%)
Supraglottis	13 (31.7)
Glottis	27 (65.8)
Subglottis	1 (2.4)
Transglottic	-
Total	41 (100)

Table 4: Grading of squamous cell carcinoma

Grades	Number of cases (%)
I	10 (25.6)
II	26 (83.8)
III	3 (7.6)
IV	-
Total	39 (100)

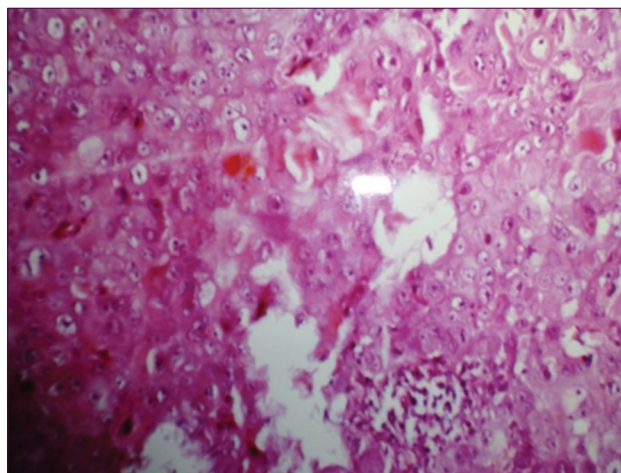


Figure 5: Squamous cell carcinoma of larynx

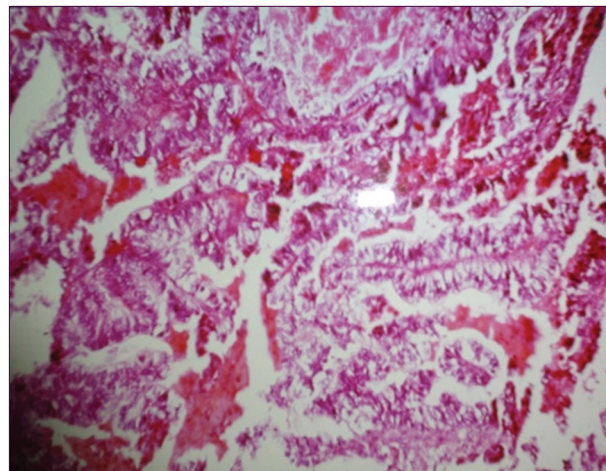


Figure 6: Adenocarcinoma of larynx

isolated laryngeal involvement without nasal disease have been communicated.^{16,19} In this study, scleroma of larynx was observed in biopsy of nasal cavity and also glottis.

As per this study, all 8 patients with vocal nodules were aggressive voice users. Regarding etiology laryngoceles, different workers have different opinions which include increased transglottic pressure, congenital defect in laryngeal ventricle, and carcinoma of larynx and can occur at any age.²⁰ As per this study, an association of cancer larynx with laryngocele was not appreciated.

In the present study, out of 95 laryngeal lesions, 8 benign tumors were observed, 7.4% were squamous papillomas, and 1.1% were hemangiomas, and the ratio of benign and malignant tumors was 5:1. In Sharma *et al.*²¹ study, the ratio of benign to malignant tumors was 2:3. Out of the benign tumors, 70% were vocal polyps, 20% were squamous cell papilloma, and 10% were chronic inflammation. Most common benign tumor found by Arnold *et al.*²² was papilloma, Cocks *et al.*²³ found vocal cord polyps, and Nerurkar *et al.*²⁴ reported recurrent respiratory papilloma.

Laryngeal cancers formed 7.01% of all cancers detected. Out of 95 laryngeal biopsies, 41 (43.2%) malignant tumors noticed, which is the predominant one. Out of 41 malignant tumors, 39 were SCC, basaloid squamous type and adenocarcinoma were one each. Many other studies also reported SCC as a predominant type (Table 5).

A highest number of malignant tumors were seen between 41 and 60 years in this study. Cancer of larynx forms about 2.2% of all cancers in men and 0.4% in women.²² Other studies also documented that malignant tumors most commonly notice in the age group of 40-60 years, incidence of malignancy increases with increasing age³¹ and in women malignant tumors were noticed one decade younger than males.²³

In this study, there is male preponderance in malignant tumors when compared to females. Males were 36 (87.8%) and females were 5 (12.1%), and the ratio is 7.2:1. This line is supported by Bakshi *et al.*³⁰ and Goiato and Fernandes.³²

Table 5: Incidence of SCC in various studies

Study	Percentage of SCC
Kaufman and Burke ²⁵	90
Kumar <i>et al.</i> ²⁶	95
Domanowski ²⁷	96
Jaiswal and Hoang ²⁸	99
Wang <i>et al.</i> ²⁹	99
Bakshi <i>et al.</i> ³⁰	69 non-keratinizing SCC 27 Keratinizing SCC

SCC: Squamous cell carcinoma

Sharma *et al.*²¹ documented that males were predominantly affected with benign (7:3) and malignant tumors (29:1) than females.

Among 36 males, 34 (94.4%) were smokers. Smoking and male variables in relation to malignant tumors were statistically significant in this study. Among smokers, death rate is 20 times higher than non-smokers.³³ Sharma *et al.*²¹ reported that smoking is plays an important role in benign (25%) and malignant tumors (73.2%). The symptoms of laryngeal tumors vary from mild hoarseness of voice to life-threatening distress.

The most frequent site for occurrence of malignant tumors of larynx is glottis (65.8%) followed by supraglottis (31.7%) in the present study. The majority of the tumors were Grade II (83.8%). This is in similar to Bastian observations.³⁴ In contrast to our study, sharma *et al.*,²¹ Thompson *et al.*,³⁵ and Bakshi *et al.*³⁰ reported more number of supraglottic tumors followed by glottic, subglottic, and transglottic tumors.

In the present study, among malignant tumors 26 (63.4%) were moderate differentiated, 11 (26.8%) were well differentiated, and 4 (9.7%) were poorly differentiated. Most glottic carcinomas were well to moderately differentiated, whereas a high percentage of those located in the other regions of larynx were moderate to poorly differentiated.³⁶

CONCLUSION

From this, we conclude that among laryngeal lesions, malignant tumors were most common followed by chronic non-specific laryngitis. Among malignant tumors, SCC observed most commonly. Malignant tumors were associated with smoking and hoarseness of voice and were more in males than females. The most frequent site for occurrence of malignant tumors of the larynx is glottis and supraglottis. In recent days, pre-operative biopsy procedures give good results because of fiber optic endoscopic assisted biopsies, help to confirm malignancy and also help to differentiate the tumors. Accurate diagnosis with biopsy on clinical suspicious lesions will help to treat patients early and promptly. Health education in communities in relation to tobacco usage will help to reduce the incidence of malignant tumors.

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Magnetic Resonance Imaging Susceptibility-weighted Imaging is More Reliable to Detect Hemorrhage and Calcification than Magnetic Resonance Imaging T2*-weighted Gradient Echo in Brain Imaging

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Abstract

Introduction: Magnetic resonance imaging (MRI) of the brain is the best modality to visualize brain parenchyma and brain pathology. Apart from routine sequence, T2*gradient echo (GRE) sequence was being used to detect calcification and bleed. We have studied that the sensitivity and reliability of MR susceptibility-weighted imaging (SWI) sequence are far better than T2*GRE sequence for detecting cerebral microbleed (CMB) and calcification.

Materials and Methods: The study was a retrospective study conducted with 50 patients with symptoms and signs of brain pathology. The patients underwent MRI and computerized tomography (CT). The MRI was performed in 1.5 Tesla scanner, and CT was performed in 128 multislice CT scanner using recommended sequences. The obtained images were being subjected to radiological analysis and interpretation.

Results: Out of 50 cases, SWI exclusively identified CMB in 16 cases in which even CT failed to identify the lesion. SWI sequence in MRI is a better sequence to detect bleed and calcification in brain parenchyma.

Conclusion: Both the modality was being carried out in all patients including normal patients with prescribed sequences. On comparison with T2*GRE sequence, SWI is excellent in spatial resolution for evaluating CMB and calcification.

Key words: Cerebral calcifications, Cerebral hemorrhage, Cerebral microbleed, Magnetic resonance imaging, Magnetic resonance imaging brain, Susceptibility-weighted imaging, T2*-weighted gradient echo imaging

INTRODUCTION

Computerized tomography (CT) of the brain is being considered as gold standard for evaluation of bleed and calcification of brain, though magnetic resonance

imaging (MRI) is considered as best modality to view brain anatomy, physiology, and pathology.¹ In MRI T2*gradient echo (GRE) sequence, it is being used to detect calcification and bleed, but still it cannot able to detect the calcification and bleed to a certain extent.^{1,2} After the introduction of susceptibility-weighted image (SWI) sequence, we were able to determine calcification and even cerebral microbleed (CMB) in brain, equivalent to that of CT brain images.³

Since CT brain cause radiation hazardous and contraindicated to pregnancy patient, we can use MR SWI sequence for detecting calcification and cerebral microbleed.^{4,5}

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MATERIALS AND METHODS

The study was conducted at the Chettinad Hospital and Research Institute. The patients were examined by two different radiologists. It is a retrospective study; both the genders were included in this study. The study is done after proper consent for both MRI as well as CT. The MRI is done in GE 1.5 Tesla scanner, and CT is done in PHILIPS 128 multislice CT scanner.

Control Group

Brain images of the 50 patients, age ranging from 18 to 60, were examined. Based on the visibility of pathological structures, we were using three-point confidence scale: (1) Invisible, (2) partial visible, and (3) clearly visible.

Experimental Group

The acquired image of the 50 patient is taken for random sampling and calculated with routing workload in the department, in which 29 are male and 21 are female, and the age ranges from 18 to 60 (mean age = 36.5).

Exclusion Criteria

MRI is contraindicated for the following patients:

1. Patients with cardiac pacemaker
2. Patients with metallic implants
3. Claustrophobic patients.

Score System

The grading system is being categorized under 6 grading units, namely:

Score 0: Normal patient

Score 1: Visualized in CT images and not visualized in MR images

Score 2: Visualized in CT images, MR (SWI sequence) image and not visualized in MR (T2*GRE sequence)

Score 3: Visualized in both CT and MR SWI and GRE sequences

Score 4: Visualized in MR (SWI) sequence and not visualized in CT images

Score 5: Visualized in T2*GRE sequence and not visualized in CT images and MR SWI.

Image Acquisition and Image Interpretation

- The MRI study was conducted in 1.5 Tesla GE Signa HDxT MRI scan (Table 1)
- The CT scan of brain study was scanned in 128 Slice PHILIPS ingenuity core CT scan
- 8 channel phased array head coil was being used for MRI
- Two radiologists examined the images independently for qualitative analysis on independent AW GE workstation with MPR (multiplanar reconstruction).

RESULTS

We have included 50 patients for this research after getting proper consent.

The results are given below:

- 24 patients were normal categorized Score 0
- 0 patient in Score 1
- 8 patients in categorized in Score 2
- 2 patients were categorized under Score 3
- 16 patients were categorized under Score 4
- 0 patient in Score 5.

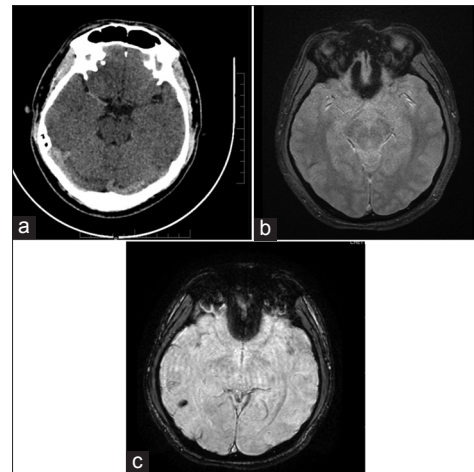
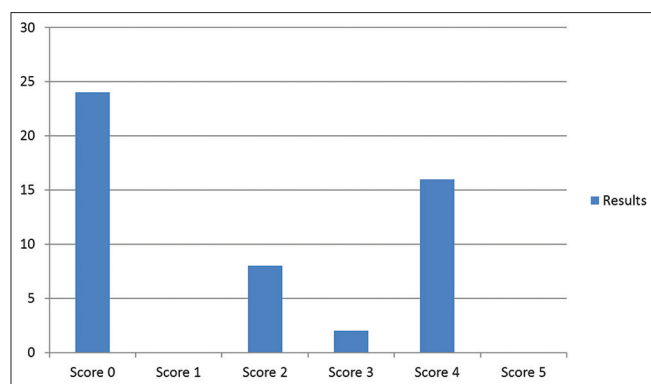


Figure 1: (a) Plain computerized tomography axial brain image shows no abnormalities, (b) Magnetic resonance imaging (MRI) gradient echo axial image shows no significant abnormalities and, (c) MRI susceptibility-weighted imaging shows blooming in the right parietal lobe

Table 1: Parameters and sequences used for the study

Parameters	MR-T2 FLAIR	MR-T2 W FSE	MR-T1 W SE	MR-T1 W SE	MR-T2 FLAIR	MR-T2 W GRE	MR SWI	CT
Mode of acquisition	2D	2D	2D	2D	2D	2D	3D	2D
Plane	Axial	Axial	Axial	Sagittal	Coronal	Axial	Axial	Axial
FOV (mm)	250	250	250	250	250	250	250	250
TR	8002	4800	1100	1100	8002	1500	62	
TE	85	101	26	26	85	150	41	
Matrix	256*160	320*192	320*192	320*192	256*160	512*224	352*224	512*512
Slice thickness (mm)	3	3	3	3	3	3	2	3
Interslice gap (mm)	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5

SWI: Susceptibility-weighted image, CT: Computerized tomography, FSE: Fast spin echo, Flair: Fluid-attenuated inversion recovery, GRE: Gradient echo, MR: Magnetic resonance, 2D: Two-dimensional, 3D: Three-dimensional



Graph 1: Results

Graphical representation of the results is shown in Graph 1.

DISCUSSION

In our study, we found that CMB and calcification are better seen in SWI sequence rather than T2*GRE sequence. CMB is caused by structural abnormalities of small vessels in the brain, resulting small chronic hemorrhage, which occurs in normal aging, cerebral vascular disease, and dementia, which may damage the adjacent brain cell causing some impairment.^{6,7} The byproduct of CMB is hemosiderin which is superparamagnetic substance, as hemosiderin is high susceptibility to magnetic field, it causes inhomogeneity when placed in the high signal which is called as susceptibility effect, whereas the GRE sequence is generated by (a) use of gradient coil to generate transverse magnetization and (b) make the flip angle lesser than 90 degrees.^{8,9} Hence, SWI is far better than T2*GRE sequence in early diagnosis in CMB. The patients also underwent CT brain for correlation.

SWI also helps in differentiation of hemorrhage and calcification in brain tumors.¹⁰

Three dimension images of SWI can also be viewed in multiplanar reconstruction as it has good spatial resolution than T2*GRE sequence.¹¹

The images of (Figure 1) SWI, T2*GRE, and the CT images of the brain belongs to the same patient which

reveals that SWI sequence in MRI is better sequence to detect bleed in brain parenchyma.

CONCLUSION

In our study, both the SWI and GRE sequences were being carried out in all patients including normal patients with prescribed sequences, which we infer that SWI sequence in MRI imaging of brain is better spatial resolution for diagnosing CMB and calcification than T2*GRE sequence, we can also avoid CT brain, since radiation is hazardous to health.

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Distal Motor (M) Latency, F-wave Latency, and M/F Ratio in the Diagnosis of Diabetic Neuropathy

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Abstract

Introduction: Most common complication of diabetes mellitus is diabetic neuropathy and when compared to non-diabetic participants and diabetic patients have 12 times higher risk of amputations due to diabetic neuropathy.

Aim: To investigate the usefulness of distal motor (M) latency, F-wave latency, and M/F ratios in the early diagnosis of diabetic neuropathy.

Materials and Methods: A total of 30 patients with diabetic neuropathy and 30 healthy control participants without diabetes were recruited. Distal motor (M) latency and F-wave latency were measured, and M/F ratios were calculated.

Results: M and F latencies were longer in patients with diabetic neuropathy when compared to control group, and M/F ratios were smaller in the patient group than the control group in all the nerves.

Conclusion: According to the results of the present study, M-latency, F-latency, and M/F ratio were the useful parameters in the diagnosis of diabetic neuropathy.

Key words: Diabetes mellitus, Diabetic neuropathy, F-wave latency, M/F ratio

INTRODUCTION

India was in top position in the diabetes mellitus, in 2000, with 31.7 million people affected with it.¹ The causes of the rapid growth of diabetes in India is multifactorial which includes genetic, environmental factors and changing lifestyle.² The World Health Organization has estimated that the number of adults with diabetes in the world would increase alarmingly from 135 million, in 1995, to 300 million in 2025.³ Most common complication of diabetes mellitus is diabetic neuropathy and when compared to non-diabetic participants and diabetic patients have 12 times higher risk of amputations due to diabetic neuropathy.⁴ Diagnosis of diabetic neuropathy is based on symptoms and physical examination, which may include the Semmes-Weinstein

monofilament and the 128 hz tuning fork. However, simple screening methods are of limited value in early neuropathy. Nerve conduction studies (NCS) are the most sensitive and specific methods to detect diabetic neuropathy.⁵

When other NCS have been normal, F-wave has been found of use in diagnosis of certain types of peripheral neuropathies. F-waves were reported by Magladery and McDougal, in 1950, on foot muscles. The F-wave is so named because it was originally studied in the small muscles of the foot.⁶ F-waves are one of the late responses by supramaximal electrical stimulation of peripheral motor nerves. It is generated by stimulation of anterior horn cells of the spinal cord following antidromic propagation of the stimulus on the motor nerve.⁷ The aim of the present study was to investigate the use of F-wave latency, distal motor (M) latency, and M/F ratio in the diagnosis of diabetic neuropathy.

MATERIALS AND METHODS

The present study was conducted on 60 participants in the following groups: 30 patients with diabetic neuropathy

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(15 men and 15 women) and 30 non-diabetic participants as control group (15 men and 15 women). All the research participants were between the age group of 40 and 60 years. The mean age of cases and controls were same. Mean duration of diabetes mellitus was 21.02 ± 17.65 years. The diabetic participants without any other associated medical conditions were included in the study. The diabetic patients with other associated diseases which may affect nerve conduction were excluded from the study. The present study was a non-invasive method of estimation of nerve conduction using electromyography/evoked potential system (Nicolet/Systems - USA make). The F-wave latency and M-latency were measured, and M/F ratios were calculated and recorded. All the measurements were recorded in median, ulnar, tibial, and common peroneal nerves bilaterally in cases and controls.

Statistical Analysis

Data were presented with mean and standard deviation. F-wave latency, M-latency, and M/F ratio were evaluated by unpaired Students *t*-test and regression analysis along with ANOVA with duration of diabetes as the independent variable and other parameters as dependent variables. A level of $P < 0.05$ was accepted as statistically significant.

RESULTS

The mean and standard deviations of M-latency, F-latency, and M/F ratio for median, ulnar, common peroneal, and tibial nerves were presented in Table 1. The M and F latencies are slower in diabetic neuropathy (patient) group than that of non-diabetic (control) group, and M/F ratios in the diabetic neuropathy group were significantly smaller than that of the control group.

There was a statistically significant difference between the diabetic neuropathy group and control group in relation to M-latency in all the 4 nerves ($P < 0.05$). F-latency was longer in patient group when compared to control group in all the 4 nerves, but statistically significant difference was found only in ulnar and common peroneal nerves. M/F ratios were smaller in the patient group than in control group in all the nerves, but statistically significant

difference was found only in median and common peroneal nerves.

In the study of electrophysiological properties of nerve conduction, taking the duration of diabetes as an independent variable, we got negative slope values for velocity and amplitudes and positive slope values for F-latency, M-latency, and M/F Ratio for median, ulnar, common peroneal, and tibial nerves on both sides.

DISCUSSION

F-wave studies were added to conventional NCS to detect the diabetic neuropathy in early stage.⁸ In the present study, the F and M latencies were longer in diabetic than in controls. We observed a symmetric pattern in delaying of conduction velocities and decrease of amplitudes and corresponding changes in F and M latencies. This is in confirmative with previous studies by Partanen *et al.*⁹

The M/F ratio is not influenced by age, whereas motor conduction velocity, sensory conduction velocity, and F-latency may be influenced by age.¹⁰ In the present study, M/F ratio was calculated from M and F latencies and found smaller values in the patient group than in controls. The results in relation to M/F ratio were similar with another study by Parkhad and Palve. Pathological changes in diabetic neuropathy are very complicated; some studies suggest that electrophysiological and pathological evidence of segmental demyelination as the primary lesion; other studies state that axonal damage to be the initiating events. Segmental demyelination and axonal damage both coexist in patients with diabetic neuropathy. The F-latency and M/F ratio have been used in an effort to clarify this patterns.¹¹

CONCLUSION

There was a positive correlation between the duration of diabetes and M and F latencies in all the nerves. The m and F latencies were longer in the patient group than control group in all the nerves. Based on the results of the present study, M-latency, F-latency, and M/F ratio were the useful parameters in the diagnosis of diabetic neuropathy.

Table 1: M latency, F latency and M/F ratio of median, ulnar, common peroneal and tibial nerves in patients of diabetic neuropathy and controls

Nerve / Parameters	M-latency		F-latency		M/F ratio	
	Diabetic	Non diabetic	Diabetic	Non-diabetic	Diabetic	Non-diabetic
Median nerve	3.88±1.32	2.96±0.43	26.26±9.59	24.92±1.43	6.35±2.63	8.53±1.28
Ulnar nerve	2.75±1.00	2.40±0.43	28.36±6.76	25.24±1.1.56	10.52±2.26	10.81±1.90
Common peroneal nerve	3.88±1.05	2.86±2.18	42.72±7.06	32.89±24.38	9.24±8.80	12.46±5.95
Tibial nerve	4.41±0.69	3.84±2.22	44.12±7.75	41.54±19.78	9.31±13.12	10.25±2.43

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Utility of Three-dimensional Multiple Planar Volume Reconstruction and Transparency Lung Volume Rendering as a Stand-alone Imaging Technique for Diagnosis and Pre-operative Evaluation of Tracheo-esophageal Fistula

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Abstract

Introduction: The newer advances in the multi-detector computed tomography (CT) with the variegated post-processing options such as three-dimensional (3D) multiple planar volume reconstruction (MPVR), 3D transparency lung volume rendering (TL-VR), and virtual bronchoscopy have not only simplified the diagnostic approach to an infant with primary or secondary tracheo-esophageal fistula (TEF), but also has reduced imaging time and radiation dose.

Aim: Evaluate utility of 3D MPVR and 3D TL-VR as a stand-alone imaging technique in the diagnosis and pre-operative depiction of primary or recurrent TEF.

Materials and Methods: Infants with a clinical diagnosis of TEF - in whom preliminary imaging like Kiddygram, Barium swallow, and conventional CT were inconclusive - were enrolled for the study. 10 infants were evaluated over a period of 2-year, from January 2014 to December 2016. Noncontrast thin-section CT (Philips Ingenuity 128 Slice) was done, post-processing was done with 3D MPVR and TL-VR. Imaging findings were correlated with per-operative records.

Results: Of the 10 infants, 3 had primary TEF and 3 had recurrent TEF. 3D MPVR and TL-VR done accurately demonstrated the orifice and the tract in all 6 on MPVR, 4 were depicted on TL-VR. 2 infants suspected to have TEF based on other imaging modalities, the thin section CT with 3D MPVR and TL-VR did not demonstrate a fistulous tract; the surgical outcome in these 2 was negative. The other 2 infants, with normal MPVR imaging, were followed up for 3/12 with satisfactory clinical outcomes. An accurate correlation with per-operative findings was noted with positive predictive value of 100% and negative predictive value of 100%.

Conclusion: 3D MPVR and 3D TL-VR are novel post-processing techniques which have simplified pre-operative evaluation of TEF, rendering other imaging modalities largely redundant. It is an invaluable imaging tool that not only aids in prompt early diagnosis but also offers excellent pre-operative imaging depiction of the size, location and course of tract, particularly in patients with recurrent TEF.

Key words: 3D MPVR and TL-VR, MDCT, TEF

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INTRODUCTION

The reported incidence of esophageal atresia (EA) and tracheo-esophageal fistula (TEF) is approximately one in 3000-4500 live births.^{1,2} Even in cases of EA, the majority have an associated fistulous tract existing between the trachea and distal esophageal pouch. Pivotal to determining

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the surgical approach and technique in patients with EA and distal TEF, is the understanding of anatomical location of the esophageal pouch, the inter-pouch gap, up-growth of tracheobronchial tree and the presence or absence of a fistulous tract, these factors not only influence the surgical approach but also determine the post-operative strategy and prognosis.^{2,3}

Contrary to imaging in primary TEF, a recurrent TEF can prove to be one of the most challenging problems to diagnose and manage. Associated with high morbidity, recurrent TEF rarely closes spontaneously and typically requires surgical repair.³⁻⁵ The incidence of recurrent TEF has been reported to be about 10% in most series.⁶⁻⁸ Recurrent TEF is more common following an anastomotic leak as this may lead to the formation of an abscess which eventually erodes into both trachea and esophagus leading to the formation of a secondary fistula. Anastomotic dilatation is also one of the contributory factors in re-communication. As a result of repeated dilatations, mucosal tear, progressive weakening of the suture line and peri-esophagitis may lead to recurrence of fistula. Fiber optic pediatric bronchoscopes and/or endoscopes may not be as an easy option in terms of availability of equipment and expertise. These techniques are invasive, time-consuming, not very comfortable for the child and are not always contributory.⁷⁻¹⁰

Recent advances in the arena of post-processing of multi-detector computed tomography (MDCT) source imaging data such as reconstruction techniques with three-dimensional (3D) multiple planar volume reconstruction (MPVR), 3D transparency lung volume rendering (TL-VR), and virtual bronchoscopy (VB) have rendered a new dimension to accurate anatomical depiction of pathology pertaining to hollow viscera. MDCT can generate VR images of the trachea and esophagus quickly and noninvasively, show the anatomy and 3D relation between the two structures more clearly and accurately, and provide valuable guidance for any surgical approach.^{5,8} 3D MPVR is a reliable and straightforward technique which not only provides a multidirectional view but also enables optimal anatomical location and relationship to adjacent organs.

This study focuses on the ability of 3D MPVR and 3D TL-VR to demonstrate primary and recurrent TEF with primary non-contrast MDCT data by 128 slice MDCT. Exact location of the fistula if present and status of the lungs can thus easily be demonstrated by MDCT. Post-processing these studies with maximum intensity projections (MIP) and VR allows a 3D evaluation of the fistula tract.

The reconstruction technique involves creation of new and customized visual representations by applying mathematical

algorithms to the originally acquired data. The technique extracts one single parameter of the volumetric data and produces two-dimensional (2D) reconstructions and then creates a 3D model, which can be further manipulated for visualizing complex structures. Such operations are used in Shaded surface display volume rendering technique (SS-VRT) and VB techniques. Data can also be generated from a semi-automated input given by the operator which is fundamental for curved plane reconstructions. MPVR and 3D TL-VR are excellent techniques to use objectively. A technique like minimum intensity projections (Min-IP) is a 2D data visualization method that enables detection of low-density structures in a given volume. Only the lower Hounsfield value structures are represented regardless of their plane of location. For example, by performing a Min-IP mapping of the thorax before administration of contrast, an image of the bronchial tree can be generated since the bronchi, being air-filled, are the least dense structures of the thorax (Figure 1) significantly reducing the time required to analyze complex multiplanar or nonlinear structures. SS-VRT is a technique that creates a 3D visual illustration of CT volumetric data for display from any desired perspective. SS-VRT images provide a sensation of three-dimensionality that is significantly superior to other VRTs.¹¹⁻¹³

MATERIALS AND METHODS

All infants who presented with recurrent infections and varying degrees of respiratory distress during the period of March 2014 to July 2015, in whom a diagnosis of primary TEF or recurrent TEF was considered, were enrolled for this study. All these infants underwent the primary imaging studies, viz., chest and abdominal radiograph (Kiddigram), barium swallow, conventional CT with oral contrast



Figure 1: Kiddigram (plain radiography of chest and abdomen) air esophagogram and gaseous distention of the gastrointestinal system

(3 mm slice sections), endoscopy and bronchoscopy with conflicting and/or inconclusive diagnosis. These infants then were subjected to non-contrast CT by 128 slice-MDCT. Infants were sedated and body straps were used to immobilize the patients so as to decrease motion artefacts.

About 10 infants with mean age of 8 months were preoperatively evaluated with non-contrast enhanced CT scan using 128 slice MDCT, at 64 mm × 0.625 mm collimation (Philips Ingenuity Core¹²⁸ CT). All scans were performed from the level of larynx to the diaphragm CT scan protocol was as follows: 100 kVp, z-axis automatic tube current modulation, a mean calculated CTDI dose of 1.35 mGy, Pitch of 0.58 and 0.5 s rotation and time, and 512 × 512 matrix. The scanning time was approximately 3-4 s. Images were reconstructed in the axial plane at a 0.677 mm interval with a standard reconstruction algorithm.

Real-time interpretation was undertaken on a thin-client or a stand-alone workstation using a combination of VRT, MIP, Min-IP, multiplanar reformations (MPR), curved planar reformations and 3D TL-VR protocol and VB. The use of oblique or curved reconstructions to visualize the path of fistulous tract provided added diagnostic information. The total image processing time was 20-30 min in each

patient. MPR images provide more information about esophageal walls and the surrounding tissues than MPVR or TL-VR. View of the original axial and MPR images was indispensable before the measurement of MPVR and TL-VR. Imaging features were corroborated with per-operative findings to assess accuracy.

RESULTS

Of the 10 children, three children were diagnosed to have primary TEF and three with recurrent TEF. Post-processing with MPVR revealed the orifice of TEF in 6 cases, while TL-VR images showed the orifice of TEF in 4 cases (Table 1). Good correlation of the findings was noted both on MPVR and 3D TL-VR. One child with recurrent TEF in whom the pediatric endo-bronchoscopy was suggestive of post-operative residual blind ending sinus, in whom other imaging modalities were inconclusive, thin section noncontrast MDCT with 3D MPVR and 3D TL-VR demonstrated the tract to the left main bronchus with an diverticular outpouching secondary to infection (Figure 2a and 2b). Two children with clinical suspicion of TEF had air esophagogram with gaseous dilatation of the gastrointestinal tract; these were subjected to surgery based on conventional CT which demonstrated a dubious

Table 1: Investigative pattern in patients with suspected TEF, non-contrast thin slice MDCT data with 3D MPVR/VRT and 3D TL-VR corroborated with per-operative findings

Status/patient numbers	Primary imaging modalities	3D MPVR/VRT/3D TL-VR on MDCT	Post-operative outcome
Clinical history suggestive of TEF: 3 infants	Kiddigram: Air oesophagogram with gross dilatation of the stomach, patchy areas of consolidation with collapse in the lungs Barium swallow: Tract not demonstrated, though orifices were visualised on endobronchoscopy	Fistulous orifice and the tract were demonstrated in all three infants	Surgical intervention MDCT findings were confirmed
Clinical suspicion of TEF-4 (2+2)	Kiddigram: Air oesophagogram with gross dilatation of the stomach, patchy areas of consolidation in the lungs Barium swallow: Negative in all four, and paediatric endobronchoscopy did not reveal an orifice CT (conventional protocol) with oral contrast: Suspicious tract noted in two patients, two patients had consolidation with collapse with possible TEF	Fistulous orifice and the tract were not visualized in all four children	In view of recurrent respiratory tract infection and possibility of tract noted on conventional CT, Surgical exploration was resorted to in two patients, however no tract was detected 2 patients were not subjected to surgery. Only follow up. Patient was normal on 3 months review
Post-operative. status with recurrent LRTI and growth retardation raised the clinical suspicion of secondary TEF in 3	Kiddigram: Air oesophagogram with gross dilatation of the stomach Barium swallow: Negative CT (conventional protocol) with oral contrast: Negative Pediatric endobronchoscopy: Blind ending outpouching noted, reported as a sinus, no residual fistula	Residual fistulous tract in 2 Recurrent tract in 1	Surgical intervention was done based on non-contrast thin slice CT findings Per-operative findings were concordant with MDCT findings
Total cases suspected TEF: 10	Conventional CT with oral contrast: False positive in 4 (due to artefacts) Barium swallow: Negative in 6	False positive: Nil False negative: Nil	Accuracy: PPV and NPV 100%

TEF: Tracheoesophageal fistula, MDCT: Multi-detector computed tomography, 3D: Three-dimensional, MPVR: Multiple planar volume reconstruction, VRT: Volume rendering technique, TL-VR: Transparency lung volume rendering, CT: Computed tomography, LRTI: Lower respiratory tract infection, PPV: Positive predictive value, NPV: Negative predictive value

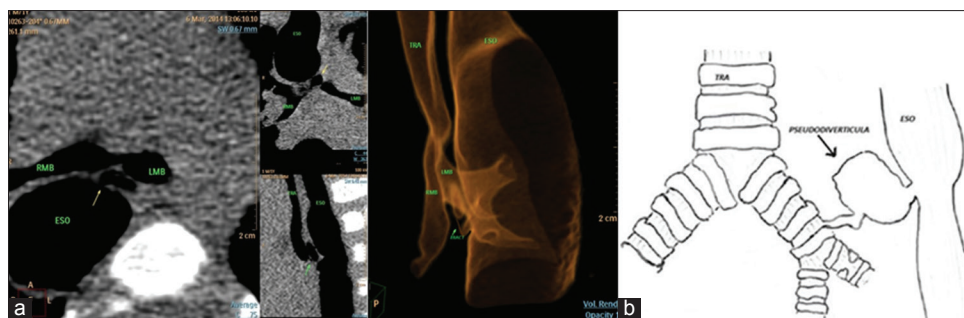


Figure 2: (a) Multi-detector computed tomography reconstructed image three-dimensional (3D) multiple planar volume reconstruction and 3D transparency lung volume rendering: Esophageo-bronchial fistulous communication with pseudo diverticulum, demonstrated in an infant, failing to thrive and distressing respiratory infections, with history of old surgical repair for tracheoesophageal fistula and esophageal atresia 6 months earlier. (b) Schematic representation pseudo diverticulum with esophago-bronchial fistula

tract, thin slice MDCT and post-processing however did not demonstrate the fistulous tract. However, in view of the air esophagogram (Figure 1) and suspicion of a tract on conventional CT the infants were subjected to surgery; the surgical outcome in these two was negative for a fistulous tract. Retrospective evaluation of conventional CT done elsewhere revealed the tract was secondary to an artefact. The other two children with similar findings, in whom the imaging was normal, were followed up for 3 months; they had no recurrence of symptoms.

Thin section MDCT used in conjunction with 3D MPVR and TL-VR correlated well with the findings at surgery with positive predictive value (PPV) and negative predictive value (NPV) of 100% as opposed to barium swallow wherein the PPV was 60%, but NPV was only 40% and conventional CT protocol (3 mm with oral contrast), false positives resulted in unnecessary surgical intervention and exploration owing to streak artefacts.

DISCUSSION

The newer advances in the MDCT, reduced imaging time with low dose imaging options, the variegated post-processing options such as 3D MPVR, 3D TL-VR and VB and endoscopy options has simplified the diagnostic approach to a child with primary or secondary TEF. Volume rendered images of the trachea and esophagus can be quickly and noninvasively generated with excellent delineation of the anatomy and 3D relation between the two structures. Imaging information thus obtained is invaluable in providing guidance for surgical approach to cases of primary or secondary TEF.^{4,5,8} This study highlights the ease with which the non-contrast thin slice acquisitions can be performed and the dubious role of other conventional imaging modalities available till date. In all our patients, the anatomic structures were optimally delineated, excellent 3D rendering of the pathology aided

in surgical exploration, particularly in infants with recurrent TEF.

One study by Tam *et al.*¹¹ mentioned that axial images can be difficult to interpret; a fistula may be demonstrated only partially or missed and his study mentioned that direct sagittal CT has been used in newborns to accurately diagnose EA and TEF, enabling visualization of the entire length of the esophagus, complete with atresias, fistulas, and gap length. The better detection of site of fistula by axial images in this study can be explained by the use of 128 slice MDCT that provides high resolution images than the older versions of CT scanners used in the study by Tam *et al.* In our limited experience, axial imaging was found to be the best imaging plane for detection of orifice of the fistula, demonstration of the tract was best noted in the sagittal/oblique MPR and 3D TL-VR followed by the coronal MPR images.

3D MPVR images, 3D TL-VR, and virtual tracheo-bronchoscopy play a corroborative role to the diagnostic data obtained over thin axial images and facilitate visualization of the complex anatomic features enabling a better pre-operative orientation to the surgeon.⁵ Virtual tracheo-bronchoscopy findings were concordant with the endoscopy and bronchoscopy findings in two patients pertaining to the orifice; however, the communication could not be demonstrated owing to the size and plane of the tract.

The importance of radiation dose in pediatrics cannot be overlooked. Radiation dose is deemed as an important issue in pediatrics as it is well-established fact, the lifetime cancer mortality risk attributable to CT examinations is considerably higher than in adults and although a modern CT gives low-grade exposure; this examination is still associated with radiation hazards.¹³⁻¹⁵ However considering, the number of X-rays and imaging the infants were subjected to before the present CT, the cumulative dose

is often overlooked, particularly in infants with recurrent TEF, the component of cumulative dose is significant, in such case scenarios, this CT protocol can be resorted as primary imaging option.

In this study, we used automated anatomic modulation software and neonate application with selection of appropriate scanning parameters to significantly minimize radiation dose. In infants where there is clinical suspicion of TEF, primary or secondary, we advocate prompt imaging with thin section non-contrast MDCT with utilization of the post-processing MPVR and 3D TL-VR tools of diagnosis as the first line of radiological investigation.

CONCLUSION

With the advent of MDCT with post-processing techniques such as 3D MPVR, 3D TL-VR and VB techniques, there is a paradigm shift in the imaging approach to evaluation of TEF. A single modality approach has not only rendered imaging cost-effective but also radiation friendly in terms of cumulative cost and radiation incurred with repeated studies. Particularly in patients with recurrent TEF, this mode of imaging has revolutionized the pre-operative diagnostic approach ensuring prompt diagnosis and excellent delineation of pathology for the operating surgeon. Good accuracy and excellent anatomical depiction has scored over the conventional imaging options available till date, rendering the same largely redundant.

Although the numbers evaluated in our study is small, the results obtained are significant. One modification to our imaging technique was air instillation via the nasogastric tube which was resorted to in patients with collapsed esophagus or absent air esophagogram.

We strongly advocate the use of these post-processing techniques which is available across all vendors in most of the MDCT suites, particularly in evaluation of infants

with secondary trachea-esophageal or broncho-esophageal fistula wherein there is substantial morbidity with delayed diagnosis.

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Clinical Study of Alvarado Scoring in Acute Appendicitis

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Abstract

Background: Acute appendicitis is a common abdominal emergency worldwide. Although there are lots of advances in the diagnostic field with the invention of sophisticated investigations, diagnosis of acute appendicitis, none of the investigations like ultrasonography, computed tomography scan can conclusively say definitely about appendicitis.

Materials and Methods: This prospective study was conducted in 128 cases of suspected appendicitis admitted in surgical unit of Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana State, India, from August 2009 to July 2011 adopting the Alvarado scoring system. Results were analyzed.

Results: A total of 128 patients were admitted who were suspected of having acute appendicitis. A total number of cases operated suspecting acute appendicitis were 113 of which 97 were found to have acutely inflamed appendix. Results of Alvarado score of operated patients are as follows: 86 patients had score 7-10, and 27 patients had score 5-6, sensitivity in males is 80.4%, and 74.07% in females. The positive predictive value in males was 93.18% and 74.07% in females. The patients with Alvarado score <5 were kept under observation. None of the patients required surgery.

Conclusion: It is simple to use and easy to apply since it relies only on history, clinical examination, and basic lab investigations. It can work effectively in routine practice as an adjunct to surgical decision-making in questionable acute appendicitis. It is effective in children and men but diagnostic laparoscopy is advised to minimize the unacceptably high false-positive rate in women. It is cost-effective and can be used in all district general hospitals with basic lab facilities. Alvarado scoring system significantly reduces the number of negative laparotomies without increasing overall rate of appendicular perforation.

Key words: Acute appendicitis, Alvarado score, Rebound tenderness

INTRODUCTION

Acute appendicitis is the acute inflammation of the appendix. It is the most common surgical cause of emergency laparotomy. Simple appendicitis can progress to perforation, which is associated with a much higher morbidity and mortality, and surgeons have, therefore, been inclined to operate when the diagnosis is probable rather than wait until it is certain.¹ Despite more than 100 years' experience, accurate diagnosis still evades the surgeon.

Owing to its myriad presentations, acute appendicitis is a common but difficult diagnostic problem. The accuracy of the clinical examination has been reported to range from 71% to 97% and varies greatly depending on the experience of the examiner.² However, because missed ruptured appendices have dire consequences, surgeons have traditionally accepted a 20% rate of negative findings at appendicectomy and the removal of a normal appendix.³ The rate of negative appendicectomy (Removal of a normal appendix in patients with other causes of abdominal pain) is reported to be between 20% and 30%.^{3,4}

The classical signs and symptoms of acute appendicitis were first reported by Fitz⁵ in 1886. Since then it has remained, the most common diagnosis for hospital admission requiring laparotomy.^{6,7} Approximately, 6% of the population will suffer from acute appendicitis during their lifetime; therefore, much effort has been directed toward early

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diagnosis and intervention.⁸ This effort has successfully lowered the mortality rate to <0.1% for non-complicated appendicitis, 0.6% where there is gangrene, and 5% for perforated cases.⁸ The diagnosis of appendicitis can be difficult, occasionally taxing the diagnostic skills of even the most experienced surgeon. Equivocal cases usually require inpatient observation. This delay in diagnosis may increase the morbidity and costs. Attempts to increase the diagnostic accuracy in acute appendicitis have included imaging by ultrasonography, computer aided diagnosis, laparoscopy, and even radioactive isotope imaging.⁹⁻¹² Various scoring systems have been devised to aid diagnosis.^{13,14}

The Alvarado Score¹⁴⁻¹⁶

Alvarado in 1986 put forward a scoring system for diagnosing acute appendicitis. The scoring system as described by Alvarado is based on three symptoms, three signs, and two lab findings.

According to the scoring system, patients with a score of 1-4 are not considered likely to have acute appendicitis. Those patients with a score of 5-6 are considered to have a possible diagnosis of appendicitis but not convincing enough to warrant immediate surgery, and they are marked for further review. Those with a score of 7-8 are considered to have a probable acute appendicitis and those with a score of 9-10 are considered to have an almost definite appendicitis and submitted to surgery. The score can increase or decrease on reassessment. The lab finding of leukocytosis is defined as a white cell count in excess of 11,000/mm³. The left shift of neutrophil maturation (% of segmented immature neutrophils with normal total white blood cell [WBC] count) (Table 1).

MATERIALS AND METHODS

Inclusion Criteria

The patients coming to hospital with pain abdomen and diagnosed provisionally as acute appendicitis and are willing for surgery are included in the study.

Exclusion Criteria

- Patient coming to hospital with pain abdomen along with distention of abdomen
- Pregnant females
- Any mass per abdomen (other than appendicular mass)
- Patient not willing for surgery.

Number of cases: 128.

All the patients ($N = 128$) selected as per criteria from August 2009 to July 2011 were admitted in surgical unit of Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana State, India, after Ethical Committee approval and patient consent.

Depending on individual presentation of signs and symptoms, a score was calculated for each case of suspected appendicitis from 8 values (based on Alvarado scoring system).

The observed value in each case was added and expressed as end-score. According to the end score:

- Those patients with scores of $\geq 7-10$ underwent appendectomy
- Those patients with scores of 5-7 who were thought on clinical grounds to require appendectomy, it was performed
- Those patients with a score of <5 were observed and managed conservatively and reassessed
- Those patients who had mass in the right iliac fossa were observed and managed conservatively.

All the necessary investigations were done in all patients. The cases subjected to emergency surgery were adequately prepared. Whenever vomiting persisted, Ryle's tube aspiration was done. Parenteral fluids, electrolyte supplementation broad spectrum antibiotics were administered. Hourly temperature, pulse, and respiratory charts were maintained.

Surgery was done under general anesthesia or spinal anesthesia. When diagnosis of acute appendicitis was certain, gridiron incision was used. The right paramedian incision was used when the diagnosis was uncertain or when frank peritonitis was suspected.

Before resection, the appendix was assessed. The specimen was sent for histopathological examination and the reports were analyzed.

Then, a study of the observations was done and an attempt was made to correlate the clinical presentation in each case with the pathological findings.

The results of operative measures, conservative management, and histopathological examination were

Table 1: Alvarado score

	Score
Symptoms	
Migrating right iliac fossa pain	1
Anorexia	1
Nausea/vomiting	1
Signs	
Tenderness in right iliac fossa	2
Rebound tenderness in right iliac fossa	1
Elevated temperature	1
Laboratory	
Leukocytosis	2
Shift to left of neutrophils	1
Total score	10

reviewed. The accuracy of diagnosis by Alvarado scoring system was assessed.

RESULTS

One hundred and twenty eight patients were preoperatively diagnosed to have acute appendicitis were admitted and operated were studied. Of the 128 cases that were admitted with suspicion of acute appendicitis, 113 cases were taken up for surgery based on the Alvarado scoring system while 10 cases with Alvarado score <5 and 5 cases with palpable mass in right iliac fossa were kept under conservative management.

Among the 113 cases that were operated 99 cases had acutely inflamed appendix.

The percentage of inflamed appendix found on operation was 87.6%.

The age group in which acute appendicitis occurred commonly is between 11 and 30 years, i.e., about 75%.

Incidence is less in younger and older age group with peak incidence in second and third decade.

In the present series, the males outnumbered females approximately in the ratio of 3:2.

Results of Alvarado score.

The patients were categorized into three groups, i.e., male; female; and children. Out of 128 cases studied 67 were male; 42 were female and 19 were children (<12 years).

Out of 67 male patients, 44 had a score of 7-10; 13 had a score of 5-6 and 7 patients had score <5. 3 patients had mass in right iliac fossa.

Out of 42 female patients - 27 had a score of 7-10; 10 had a score of 5-6 and 3 patients had score of <5. 2 female patients had mass in right iliac fossa.

About 15 children had a score between 7 and 9 while 4 had score of 5-6. All the children were operated upon.

All the 10 patients of score <5 and 5 patients with mass in right iliac fossa were observed in the hospital and did not undergo surgery. The patients with mass in right iliac fossa were advised for interval appendicectomy.

Operative Findings

A total of 113 patients were operated, out of which 57 were males; 37 were females; 19 were children.

In male patients having score of >7-10; 41 patients had acute appendicitis; 3 patients had normal appendix and 2 patients had diseases in the form of ileal perforation and Meckel's diverticulitis. Male patients having score of 5-6 were 13; out of which 10 patients had acute appendicitis; 3 patients had normal appendix and 1 patient had mesenteric lymphadenitis.

In female patients having score of >7-10; 20 had acute appendicitis; 7 patients had normal appendix and 2 patients had other diseases, out of which 1 had pelvic inflammatory disease; 1 had twisted right ovarian cyst. In females with score of 5-6; 7 had acute appendicitis; and 3 patients had pelvic inflammatory disease.

All the 19 children (15 with score 7-10 and 4 with score 5-6) subjected to operation had acute appendicitis.

DISCUSSION

A study of 128 cases of suspected appendicitis admitted to surgical unit Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana, India, was made from August 2009 to July 2011 adopting the Alvarado scoring system.

Acute appendicitis remains a common abdominal emergency worldwide. Although there are lots of advances in the diagnostic field with the invention of sophisticated investigations, diagnosis of acute appendicitis remains an enigma for the attendant surgeon. None of the investigations like ultrasonography, computed tomography scan can conclusively say definitely about appendicitis.

Some of the investigations already discussed are costly, time-consuming, require more specialized and expert services, while some are non-feasible and not available every while.

So even today a thorough clinical examination with a basic investigation like WBC count remains cornerstone in the diagnosis of acute appendicitis. With this background, many eminent surgeons and physicians have been adopting different scoring systems to decrease negative appendicectomy.

We find the value of Alvarado score for its routine use in clinical practice. The Alvarado score is simple to use and easy to apply, since it relies only on history, clinical examination and a basic laboratory investigation. In this study, the usefulness of the scoring system was demonstrated beyond doubt by reducing number of negative laparotomies especially in men and children.

However, in women the negative laparotomy was high, and this can be avoided by laparoscopy.

The sensitivity of Alvarado scoring system in our series was as high as 80%. This indicates that by particularly adopting the Alvarado scoring system many negative appendicectomy can be reduced. Patients in whom the Alvarado score was <5 did not need subsequent appendicectomy indicating the usefulness of modified Alvarado scoring system.

In our series when the scores were more than 7 indicating strong possibility of intra-abdominal infection localized to the right iliac fossa surgery were performed within 6 h of the patient getting admitted to the hospital. The observation was that these patients had badly inflamed appendix with impending perforation once again indicating the sensitivity and specificity of the scoring system.

In our series, we had 19 cases of patients in pediatric age group. 15 of them had score more than 7 while 4 children had score 5-6. All of them were operated within 6 h. Per-operative finding was of highly inflamed appendix indicating a sensitivity of 100% in children. This is important keeping in mind the shortness of omentum in children which can cause early perforation and peritonitis with its attendant morbidity and mortality.

In our series, we had 37 cases of female patients. Out of 37 cases 27 had score of >7 and appendicitis in 20 cases the other being gynecological causes.

Since intra-abdominal infection in females, particularly in lower abdomen, can be quite confusing, as it is difficult to differentiate appendicitis from gynecological condition like twisted ovarian cyst and pelvic inflammatory disease, laparoscopy and abdominopelvic ultrasound scan can be advised as a diagnostic tool to minimize negative appendicectomy.

CONCLUSION

Alvarado scoring system significantly reduces the number of negative laparotomies without increasing overall rate of appendicular perforation.

It can work effectively in routine practice as an adjunct to surgical decision-making in questionable acute appendicitis.

- It is effective in children and men but diagnostic laparoscopy is advised to minimize the unacceptably high false-positive rate in women
- It is simple to use and easy to apply since it relies only on history, clinical examination and basic lab investigations
- It is cost-effective and can be used in all district general hospitals with basic lab facilities.

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Gingival Biotype and Gingival Bioform: Determining Factors for Periodontal Disease Progression and Treatment Outcome

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Abstract

Oral tissues show different response and behavior to different oral diseases and treatment procedures. A clinically healthy periodontium has shown to have a varied phenotypic appearance differing from subject to subject. Several researchers, on-lookers, academicians, and clinicians have tried to study in their ways about these different gingival entities. Apart from, various local factors, host response and individual host characteristics have been seen to play a central role. Gingival biotype and gingival bioform determined by factors such as crown width, crown length, gingival width, papilla height, gingival thickness, and significantly influence the disease progression as well as treatment outcome. This review describes and highlights these gingival parameters and the factors affecting it.

Key words: Bioform, Biotype, Gingival width, Papilla height, Parameters

INTRODUCTION

Research has always played a key role in the field of periodontics. With the ever increasing scientific knowledge about smaller and smaller tissues, several new aspects of etiology, pathogenesis and also the related treatment options have come up and broadened the horizon of the existing periodontology. Hence, keeping up with this research orientation, the current ongoing subject of interest is the base of periodontium - The human gingiva.

Now, since long, the explanations for the occurrences of a particular periodontal disease have been largely influenced by paradigms that reflected the understanding of the disease during that time. But today, with the improvement of our knowledge toward the pathogenesis of periodontal diseases, apart from the presence of local factors, host

response is considered to be one of the most important aspects to influence its initiation and progression.¹ This is evident from the observation that same quantity and quality of plaque exhibits differences in severity of periodontal diseases in different subjects.¹

This observation has led to speculate to other putative (associated) reasons to find out the different responses and behavior of the tissues during disease and treatment. The researchers concentrated to explain this on the basis of different systemic and local factors. Sometimes, we get progressive periodontal pockets and at another time we observe recession. Is the behavior of the local tissues responsible for this different response? In this aspect, the anatomical and histological characteristics have been analyzed extensively, and the researchers have found difference in the biological behavior, and its configuration at large, and it is speculated that this difference is responsible for different tissue responses.²

HISTORICAL BACKGROUND

A clinically healthy periodontium has shown to have a varied phenotypic appearance differing from subject to subject.³

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Several researchers, on-lookers, academicians, and clinicians have tried to study in their ways about these different gingival entities. Like in 1969, Ochsenbein and Ross suggested the occurrence of two main variants of gingival morphology:⁴

- Scalloped and thin gingiva
- Flat and thick gingiva.

While some researchers attributed this difference to the difference in shape and form of the teeth,^{5,6} there were others who proposed that it was the contour of the underlying alveolar bone which ultimately determined the gingival contour.⁴ As they served to illustrate the existence of markedly different periodontal entities, they were called as “gingival biotypes.”⁷

Now, as these observations gained momentum and caught the eye of the fellow researchers, different terminologies came up describing these varied morphologies. The term “periodontal biotype”⁸ was introduced by Siebert and Lindhe to categorize the gingiva into “thick-flat” and “thin-scalloped biotypes. In 1997, Muller H coined the term “gingival” or “periodontal phenotype” to address the common clinical observations of the great variation in the thickness and width of facial keratinized tissue.⁹ With the advent of dental implants, the term “gingival biotype” or “morphotype” was renamed to “soft tissue biotype” to encompass tissue around both teeth and implants.¹⁰

GINGIVAL BIOTYPE

The oral mucosa of every individual is divided into two soft tissue entities: Gingiva and alveolar mucosa. Both these tissues are characteristically different clinically as well as histologically.¹¹ Before, it was known that it was the proportion of these two tissues that predisposed an individual to the risk of developing mucogingival problems,¹² but now, with the deeper knowledge about the existence of variations even within these tissues, it is clear that along with their proportions, the difference in the morphologic and histologic characteristics of gingiva itself increased the likelihood of mucogingival deformities, and such variations are termed as thick and thin biotypes.¹³

The term gingival biotype¹⁴⁻¹⁷ has been used to describe the thickness of the gingiva in the faciopalatal dimension and it is a genetically determined trait.^{18,19} In general, there are two variants of gingival biotype which are found to exist as follows:

- Thick biotype (prevalence: 85%)
- Thin biotype (prevalence: 15%).

Along with this, there are also few other cases which have overlapping features of both thick and thin types in different areas of the arches.³

Thick biotype, as the name suggests, is characterized by thick gingival tissue and is generally found to be most commonly related with good periodontal health. Such a tissue is quite dense in appearance with a sufficient zone of attached gingiva. There are ample of evidence which suggest that when subjectively determined, a thick tissue resists trauma and subsequent recession, enables tissue manipulation, promotes creeping attachment, improves implant aesthetics, exhibits less clinical inflammation, and renders predictable surgical procedures.²⁰⁻²⁶ Now, the factors that are responsible for these characteristics are as follows:

1. The presence of a high volume of extracellular matrix and collagen which permits the tissue to withstand collapse and contraction.
2. An increase in the layers of epithelial keratinization, which deflects physical damage and microbial ingress.
3. An increase in vascularity. The great perfusion enhances oxygenation, clearance of toxic products, immune response, and growth-factor migration, thereby boosting healing.

On the other hand, thin biotype as the name suggests is characterized by thin gingival tissue making it delicate and almost translucent in appearance. Such a tissue appears friable, usually, having a minimal zone of attachment. The soft tissue is highly accentuated and often suggestive of thin or minimal bone over the roots labially, and evidence are there showing that the thin gingival tissue is less resistant to any inflammatory/traumatic/surgical insult and so usually exhibits pathological changes like the gingival recession.^{14,16,20,27-32} Furthermore, they are frequently characterized by osseous defects like fenestration and dehiscence.³³

As seen in the description above, the different gingival biotypes respond differently to inflammation, restorative procedures, trauma, and parafunctional habits.¹⁹ Even the tissue response to different treatments varies.⁴ Therefore, an accurate diagnosis of gingival tissue biotype is of the utmost importance in deciding an appropriate treatment plan and achieving a predictable esthetic outcome.

GINGIVAL BIOFORM

Clinically, great variation exists between humans with respect to morphological characteristics of the periodontium, and as seen above, two basic “biotypes” of gingival architecture, the “scalloped-thin” and the “flat-thick,” were proposed to exist. Thick and thin refers to the dimension of the gingival tissue in the faciopalatal dimension, whereas the terms “scalloped” and “flat” are referred as “Gingival Bioform.”

Gingival bioform refers to different scallop morphologies of the marginal and interdental gingiva, and as such three different gingival scallop morphologies are seen:

- Low
- Normal
- High.

They are found to be associated with different tooth forms:

- Circular/square tooth form shows low/shallow scallop
- Triangular tooth form shows pronounced scallop.

This shows the subjective assessment of the gingival bioforms. Objectively, a measurement of 4 mm classifies the scallop morphologies. According to this, if the distance between the interproximal gingival peaks (most coronal) and the mid-facial free gingival margin peaks (most apical) is 4 mm - normal scallop.

If distance is <4 mm - Low or shallow scallop.

If distance is >4 mm - High or pronounced scallop.

Hence, the scalloped gingiva can be categorized as high, normal, flat/low.³⁴ As known, in a healthy periodontium, the alveolar crest is positioned approximately 2 mm apical to the cemento-enamel junction (CEJ) and mimics or follows the scallop of CEJ.³⁵ In the normal and high scalloped gingival form, there is more tissue coronal to the interproximal bone than the facial bone.³⁵

Supporting this in a 1994 article, Kois³⁴ examined crestal bone levels and classified them as normal (crestal bone level is 3 mm apical to CEJ), high (crestal bone level is <3 mm apical to CEJ), and low (crestal bone level is >3 mm apical to CEJ) as found in patients with recession.³⁴

The “scalloped-thin” gingiva has been suggested to be associated with as follows:

1. Tapered crown form
2. Subtle cervical convexity
3. Minute proximal contact areas located near the incisal edge of the tooth.

The “flat-thick” gingiva, on the other hand, corresponds to a tooth with:

1. Squared facial form
2. Distinct cervical convexity
3. Relatively large, more apically located contact areas.

As discussed, the severity of symptoms associated with plaque-induced periodontal disease might vary according to different gingival biotypes. Thus, a deep periodontal pocket might exist in individuals with a “flat-thick” appearance while gingival recession occurs in individuals with a “scalloped-thin” appearance in response to plaque-associated inflammation.^{8,27}

FACTORS AFFECTING GINGIVAL BIOTYPE AND GINGIVAL BIOFORM

The different parameters which affect the two morphologic types (biotype and bioform) are gingival complex, tooth morphology, contact points, hard and soft tissue considerations, gingival bioform, and biotype. Hence, a clinician’s knowledge of anatomy, form, and function of the dentition is of paramount importance in achieving optimal treatment outcomes.

It has long been known that clinical appearance of healthy marginal periodontium differs from subject to subject and even among different tooth types. It has been suggested that many features are directly genetically determined, whereas other morphologic characteristics of the periodontium seem to be influenced by tooth size, shape and position, and biological phenomena such as growth or ageing.^{36,37}

Gingival thickness affects the biotype of the gingiva, whereas, crown width (CL): Crown length (CW), papilla height, and gingival width are responsible for determining the gingival bioform.

CW: CL

Ochsenbein and Ross first classified the gingival anatomy as either “flat” or “pronounced scalloped,” with the suggestion that flat gingiva was related to a square tooth form and pronounced scalloped gingiva was related to a tapered tooth form.⁴ Now, what determined this form of tooth was the ratio between the CW and CL of a tooth. There was a tendency for a flat gingival architecture to have a lower tooth height-to-width ratio, while a scalloped gingival architecture was associated with a higher tooth height-to-width ratio, but the differences were not statistically significant in every study.^{38,39}

It has been observed that individuals having a tapered tooth form usually have a thin, scalloped gingival architecture, and clinically; this has been associated with an increased susceptibility to recession. This theory was further supported by studies demonstrating that central incisors with a narrow crown form had a greater prevalence of recession than incisors with a wide, square form.^{3,27,40} However, Eger *et al.*, on the other hand, failed to observe a meaningful influence of CW/CL ratio on gingival thickness.⁴¹ Furthermore, a study by Cook *et al.*, who evaluated various gingival parameters in patients having different gingival biotypes did not document any significant differences between tissue biotypes and crown height to width ration, age, sex and gingival margin position.³⁸

GINGIVAL WIDTH

The keratinized portion of the gingiva on the facial aspect of the teeth extends from the margin of the soft tissue to the mucogingival junction. Not all of the gingiva covering the tooth is attached. The attached portion of the gingiva is clinically defined as the distance from depression below the projection on the external surface of the gingival sulcus to the mucogingival junction.

There is no minimum width of keratinized or attached gingival tissue necessary to maintain health, provided plaque control is adequate; however, sites with narrow keratinized gingiva have been associated with increased recession when exposed to mechanical trauma or poor oral hygiene,^{42,43} and also, it has been suggested that a wide zone of keratinized and attached gingiva is more desirable than a narrow zone or a total lack of such a zone, because a wide zone would better withstand gingival inflammation, trauma from mastication, tooth brushing and forces from muscle pull and orthodontic procedures.

Many clinicians believe that a flat gingival architecture is associated with a wider zone of keratinized tissue, while a scalloped architecture is associated with a narrower zone, and so relatively, a patient with a thin gingival biotype displays a narrower zone of keratinized tissue than a patient with a thick/average gingival biotype. Olsson *et al.* (1993) reported significantly wider keratinized tissue at facial aspects, a lower papilla height, a higher gingival angle of the crown, but no significant difference in gingival thickness in short-wide as compared with long-narrow central incisors.⁴⁰

PAPILLA HEIGHT

In contemporary dentistry, there has been an increasing demand for improved aesthetics by both dentists and patients. The existence of the interproximal papilla is pivotal to an esthetic gingival form^{15,16} which is determined by the form and position of the clinical crown, interproximal contact point, and form of embrasure space.⁴⁴

The interdental papilla occupies the interdental or embrasure space and acts as a barrier to protect underlying periodontal structures⁴⁵ and also plays an esthetic role.⁴⁶ The distance from the contact point to the interproximal alveolar crest has been identified as a critical factor in the presence of a complete papilla, with nearly 100% of papillae filling the gingival embrasure completely if contact point-bone crest distance is ≤ 5 mm.⁴⁷

Few studies have examined factors contributing to the presence and absence of dental papillae. Most focused on

the influence of crestal bone height and/or interproximal distance. Many other factors that might influence papillary appearance such as tooth form/shape, gingival thickness and keratinized gingiva/attached gingiva width, distance from the contact point to the bone crest, inter-radicular distance, size of the embrasure space, have never been fully examined, but these have been listed to be relevant factors.^{1-4,40}

As mentioned above, the morphological properties of the periodontal tissues are related to the shape and appearance of the teeth,^{5,6} which is generally divided into triangular, oval, and rectangular types. Chen *et al.*⁴⁸ suggested that there is a high likelihood that the fidelity of the interproximal papilla increases as the tooth shape becomes more rectangular. Kois²⁰ and Shigeno⁴⁹ further claimed that a rectangular tooth shape has a longer contact area and requires less of the interproximal papilla to fill up the embrasure space.

There have also been reports showing a positive correlation between gingival thickness and papilla fill. Decrease in papilla height is observed with thin biotype. Limited blood supply⁵⁰ is believed to be one of the major reasons why papilla preservation and regeneration are difficult. Thicker tissue may resist collapse and contraction due to increased vascularity and extracellular matrix volume.⁵¹ In addition, thicker keratinized gingival epithelium may be more resistant to physical damage and bacterial ingress. Therefore, thick gingival biotype has been considered more favorable for achieving optimal aesthetics.

Hence, it has been concluded from several studies that the appearance of the gingival papilla is significantly associated with age, tooth form/shape, proximal contact length, crestal bone height and interproximal gingival thickness, and the following clinical conditions were found to favor a gingival papilla that fills the interproximal embrasure space:^{52,53}

1. Young subject
2. $CW/CL \geq 0.87$
3. Long proximal contact ≥ 2.8 mm
4. Bone crest-contact point ≤ 5 mm
5. Thick interproximal gingival tissue ≥ 1.5 mm.

GINGIVAL THICKNESS

It has been suggested that different gingival entities have different tooth shapes.^{8,27} Many studies have examined the correlation between the tooth shape and gingival biotype. Sanavi *et al.*⁵⁴ claimed that the thick and flat periodontal tissues have a rectangular tooth shape, and the thin scalloped periodontal tissues have a triangular tooth shape.

Olsson and Lindhe⁴⁰ reported that long and narrow crowns have thin periodontal tissues and a high likelihood of having gingival recession compared to the thick gingival biotype, suggesting a relationship between the tooth shape and gingival biotype. On the other hand, Olsson *et al.*³ reported no relationship between the tooth shape and gingival thickness according to the CW and CL.

Studies by Morris,⁵ Olsson and Lindhe³ documented that individuals with tapered crowns have a thinner biotype, making them more susceptible to gingival recession. Chow and Wang⁵⁵ in their review article stated the presence of long narrow form with thin gingival tissue. Seo *et al.*⁵⁶ in their study did not find any statistically significant differences between the longer and shorter teeth in relation to gingival biotypes. Weisgold *et al.*²⁷ considered long tapering teeth more susceptible to gingival recession while square teeth appeared to have a greater zone of gingiva that was more resistant to gingival recession.

AGE AND SEX

The thicker biotype is more prevalent in male population while the female population consists of thin, scalloped gingival biotype.⁵⁷ On comparing, the prevalence of gingival biotypes between different age groups, the thick flat biotype is seen in younger individuals while older age group shows thin scalloped gingival biotype.⁵⁸ Vandana and Savitha⁵⁸ in their study on gingival thickness showed thicker gingiva in younger age group and stated that decrease in keratinization and changes in oral epithelium may be the contributing factors. Chang⁵⁹ in his study stated that an inverse relationship has been found to be existing between papilla height and age. Sanavi *et al.*⁵⁴ in their review article described that the inter-root bone is more in the thinner biotype. This, in turn, can cause more recession. They also stated that the interproximal papilla does not cover the spaces between two teeth in thinner biotype as compared to thick biotype. This could possibly relate to increased amount of recession and also the presence of thin biotype in older age group.⁶⁰ Chow *et al.*²⁸ also evaluated various factors associated with the appearance of gingival papillae and found significant associations with age and the crown form and gingival thickness. Olsson *et al.*^{3,40} documented that the central incisors with narrow tooth form had greater amount of recession when compared to incisors with square form. With age, the interdental papilla recedes; this explains the greater frequency of thin biotype seen with older age group.⁶¹

Anterior teeth with narrow zones of attached gingiva are frequently encountered in children. Maynard and Ochsenbein⁶² suggested that newly erupted permanent

teeth with narrow attached gingiva may run a greater risk of gingival recession. The results of some cross-sectional studies in children, teenagers, and adults indicate that the width of attached gingiva increases with age. In the permanent dentition, the gingival problems are often noticed in the age when children are candidates for orthodontic treatment, and considerable attention has been focused on various therapeutic measures.

CONCLUSION

It is evident from the above-reported literature that the shape, size, form of the tooth and the surrounding gingiva is of paramount importance for the causation and progression of disease and henceforth for the diagnosis and subsequent inter- and multi-disciplinary treatment approach. This knowledge of the tissue behavior thus helps in the right selection of the surgical/restorative/orthodontic treatment procedure for the patient.

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Acute Subthalamic Stroke Presenting as Hemiballismus: A Review of Literature

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Abstract

Acute hyperkinetic movement disorders after cerebrovascular accidents are uncommon. Among post-stroke movement disorders, hemiballismus-hemichorea is the most common disorder. It can result from subthalamic nucleus lesions as well as thalamic, basal ganglia or cortical lesions. Prognosis is, in general, good with majority responding (completely/partially) to neuroleptics (typical/atypical). We are presenting a case report with review of acute ischemic stroke presenting as hemiballismus-hemichorea with complete response to haloperidol.

Key words: Hemiballismus-hemichorea, Movement disorders, Stroke

INTRODUCTION

Acute cerebrovascular accidents or strokes are characterized by abrupt onset negative symptoms, e.g., paresis/paralysis of limbs or numbness. However, less frequently positive symptoms, e.g., hyperkinetic movements such as hemiballismus-hemichorea, myoclonus, tics, or rubral tremors can also be the acute presentation of stroke. Movement disorders after stroke present in about 1% of cases.¹ The incidence of post-stroke hemichorea was 0.54% (27 out of 5,009 stroke patients) in a study by Chung *et al.*² Lesions in basal ganglia are most frequently associated with movement disorders; and therefore, stroke involving middle cerebral and posterior cerebral arteries are the usual culprits.

CASE REPORT

A 70-year-old hypertensive man presented in the emergency with abrupt onset flinging movements in the left upper limb and lower limbs for 2 h. On evaluation,

the patient was restless, responsive to verbal commands and oriented. He had hemiballismus-hemichorea of left upper and lower limb. He had hypertension (blood pressure 196/110 mm Hg) and his metabolic profile (random blood glucose, serum electrolytes, blood urea nitrogen, serum creatinine, liver function tests, and arterial blood gas analysis) was within normal limits. Noncontrast computerized tomography of head revealed acute right subthalamic infarct with age-related cerebral atrophy. The patient was reassured and initiated on oral antiplatelets, statins, antihypertensives. Patient's involuntary movements improved with oral haloperidol and haloperidol was gradually tapered and stopped.

DISCUSSION

Chorea consists of involuntary, continual, and irregular movements that flow randomly from one body part to another, and ballism is a form of flinging high-amplitude and coarse chorea.³

Hemiballismus-hemichorea is the most common movement disorder after acute stroke.^{1,4} Dystonias are the second most common disorders after hemiballismus. The onset of involuntary movements after acute stroke is most commonly immediate but can range from days to few months.^{5,6} Hemichorea can appear early (mean 4.3 days post-stroke) compared to parkinsonism, which appears much later (mean 117.5 days post-stroke).^{3,7}

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Hemiballismus is classically considered to be secondary to contralateral subthalamic nucleus lesion. However, in the Lausanne stroke registry,¹ apart from subthalamic nucleus infarct, other sites were also involved like striatum, thalamus and pallidum, in the absence of subthalamic infarct. Similarly, Chung *et al.*² found the lesions in 27 post-stroke hemiballismus patients to be located in the caudate and putamen ($n = 6$), cortex ($n = 6$), thalamus and subthalamic area ($n = 4$), subthalamus ($n = 4$), putamen ($n = 3$), caudate ($n = 2$), and the globus pallidus ($n = 2$). Vidakovic *et al.*⁵ found subthalamic lesions in 27% of patients with hemiballismus while 27% had lesions in other parts of basal ganglia. Thus, apart from subthalamic lesions, thalamic, striatum or cortical lesions may also account for hemiballismus in post-stroke patients.

Long-term prognosis in post-stroke hemiballismus-hemichorea is usually good. Ristic *et al.*⁸ found complete response to haloperidol with/without diazepam in 56% patients, partial response in 37% and no response in 7% patients while Alarcon *et al.* found spontaneous complete recovery in 10% while partial recovery in about 83% patients.⁴

Treatment options in post-stroke hemiballismus-hemichorea are usually antidopaminergic drugs - traditional (e.g. haloperidol) or newer (olanzapine, quetiapine, clozapine); tetrabenazine; antiepileptics (valproate, topiramate) and benzodiazepines. Because of the risk

of drug-induced parkinsonism and tardive dyskinesias, tetrabenazine is preferred over haloperidol.³

CONCLUSION

Post-stroke hyperkinetic disorders are uncommon. Post-stroke hemiballismus-hemichorea is the most common hyperkinetic disorder. Prognosis in general is good with the majority of patients having complete/partial response with typical/atypical neuroleptics.

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Thrombus in Right Side of Heart Mimicking Myxoma: An Autopsy Case Report

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Abstract

The difference between cardiac thrombus and myxoma is not always easy, and a correct diagnosis is important because of its distinct treatment strategy. Among all cardiac masses, cardiac thrombi were found to be the most common diagnosis and many times the cardiac thrombi mimics myxoma. Radiological modalities offers correct diagnosis, however, in the lack of that or in some instances, pathological examination is the only reliable method to diagnose cardiac masses accurately. We are presenting autopsy case reports of two cases of sudden death in which we found cardiac masses morphologically mimicking myxoma and on histopathological examination was found to be thrombi.

Key words: Cardiac masses, Myxoma, Thrombus

INTRODUCTION

Among the most common cardiac masses are the thrombus and myxoma. The difference between thrombus and myxoma is important because of different treatment modalities. In some instances, thrombi may have stalk and can be misdiagnosed as myxoma.¹ The presence of risk factors, location, and avascular character of cardiac masses make the thrombi most likely diagnosis.² In most instances, pathological examination is the only reliable method to diagnose cardiac masses accurately.¹⁻⁴

CASE REPORT

An autopsy was performed on 57-years-old male. The patient had a history of asthmatic attack. On examination, the patient had cardiomegaly. Unfortunately, none of the radiological findings were available. A heart measuring 18 cm × 15 cm × 6 cm and weighing 450 g. On cut section,

left ventricular wall measures 2 cm, inter-ventricular septum 3 cm, and right ventricular wall (RVW) 1 cm in thickness.

A pedunculated mass of size 4 cm × 3 cm × 2 cm was present on right atrium (Figure 1a and b). The peduncle was attached to wall of right auricle. Mass was well circumscribed, mobile and with a smooth contour. On cut section, it appeared homogeneous, milky white in color, and soft in consistency. On gross examination differential diagnosis made was myxoma / Organised thrombus.

On histopathological examination, section studied from mass showed the presence of inflammatory infiltrates predominantly neutrophils along with lymphocytes, macrophages, and plasma cells against fibrinous background (Figure 2). There was no evidence of myxoma cell or myxoid material even on extensive search. The final diagnosis of organizing thrombus was made. Sections from cardiac walls showed features of myocardial infarction, myocarditis, and myocardial hypertrophy. Sections from both the coronaries showed features of atherosclerosis.

Similarly, we received formalin fixed specimen of heart, of a 24-years-old female for histopathological examination. She had a history of chronic alcoholism.

Heart received was measuring 13 cm × 10 cm × 4 cm and weighing 130 g. On cut section, all the cardiac walls thickness

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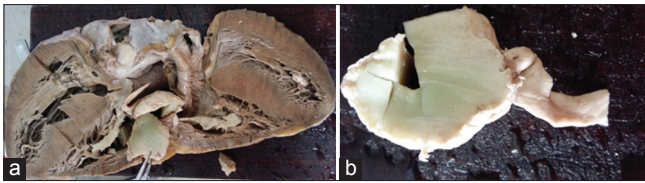


Figure 1: (a) Cut section of heart showing mass in right atria. (b) Cardiac mass with peduncle

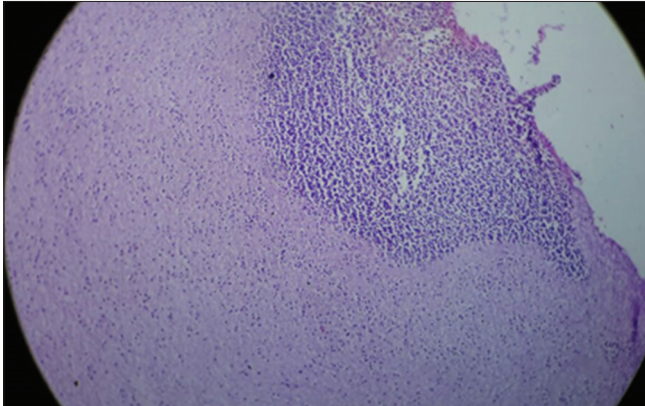


Figure 2: Microscopic picture of cardiac mass. (H and E, x10). Section shows presence of inflammatory infiltrate against fibrinous background

was within normal range. Left coronary artery (LCA) was found blocked while right coronary artery (RCA) was patent. There were two sessile, well-circumscribed masses found on the right chamber, one in right atrium measuring 3 cm × 2 cm × 1 cm and another measuring 1 cm × 1 cm × 1 cm present in right ventricle near apex (Figure 3). The tricuspid valve showed myxoid degeneration also.

On histopathological examination, RVW showed features of myocardial infarction. LCA was found to be critically blocked with thrombus with vessel wall showing features of atherosclerosis. RCA showed vessel wall thickening.

Multiple sections studied from masses showed the presence of inflammatory infiltrates predominantly neutrophils along with lymphocytes, macrophages, and plasma cells against fibrinous background (Figures 4a and b). There was no evidence of myxoma cell even on extensive search. The final diagnosis of organizing thrombus was made.

In both the above cases, we had no radiological findings or another relevant history like history of heart disease, hypertension, diabetes mellitus, and smoking except for history of chronic alcoholism in female patient.

DISCUSSION

Mural thrombi are common complications of the verity of valvular and myocardial disorders. Occasionally, they

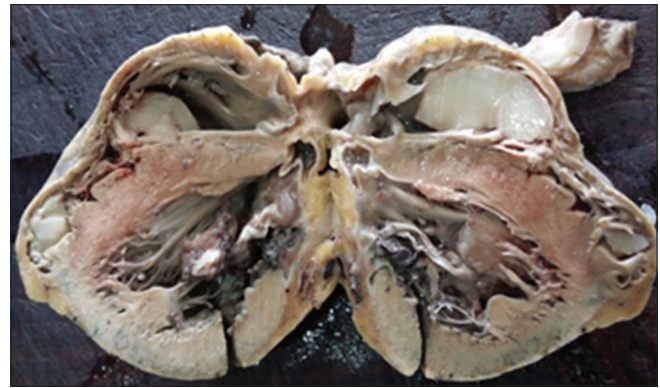


Figure 3: Cut section of heart showing cardiac masses on right chambers

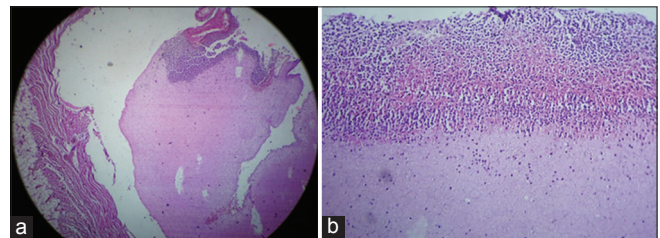


Figure 4 (a): Microscopic picture of cardiac mass (H and E, x4). (b) H and E, x10. Section shows presence of inflammatory infiltrate against fibrinous background

become enough to present mass effect or embolic episodes and can be confused with myxoma.⁵

We are reporting two cases of cardiac masses which were grossly suspected as myxoma/ organised thrombus and on histopathological examination, final diagnosis was made as organised thrombus. We had a lack of history of patient symptoms, treatment history, and history of risk factors as mentioned above. We were also lacking radiological findings of both the patients. There is paucity of literature on myxoma/ organised thrombus of heart on autopsy pathology. were also lacking.

Among all cardiac masses, cardiac thrombi were found to be the most common diagnosis⁶⁻⁹ and in some instances, the cardiac thrombi mimics myxoma.^{1,3,4}

Similarly, myxoma can simulate thrombus as thrombus may have stalk or neovascularization.^{1,4,7} The early diagnosis of above entities is warranted as both had different line of treatment and both have complications like thromboembolism. Our case report emphasis on the importance of pathological examination of cardiac mass specimen obtained by various means such as surgical resection for confirmatory diagnosis and for early commencement of proper treatment modality. Myxoma needs surgical removal of mass while if thrombus is the case, anticoagulation therapy is started which responds

well. Confirm diagnosis of cardiac mass before undergoing surgery can avoid unnecessary surgical intervention in the case of thrombus.

Our case was similar to a case report by Barbara *et al.* in which a left atrial appendage thrombus mimicking atrial myxoma was reported and confirms diagnosis was made histopathologically only.¹⁰

Cardiac thrombi appear more frequent than cardiac myxoma and are typically located in atrium and generally occur in patients with organic heart disease. In some cases, atrial thrombi may have stalk and can be diagnosed as myxoma which can lead to an unnecessary surgical resection.¹¹⁻¹⁴

Myxoma and thrombi can be differentiated using various radiological modalities, histopathological examination, and immunohistochemical staining in difficult cases with calretinin which is found in myxoma but not in thrombus.¹⁵ Sometime patient can be asymptomatic which may lead to grievous complication like our case.

CONCLUSION

A present case report illustrates the morphological diagnostic enigma of cardiac masses most commonly between thrombi and myxoma. Both of these entities are highly predisposed to embolization because of their fragile nature. This can lead to serious complications like systemic embolization and sudden cardiac death due to cardiac outflow obstruction. We emphasis on the unbeatable role of histopathological examination to arrive definitive diagnosis and so to reach early and correct

approach for the treatment modalities which can benefit patient survival.

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Management of Complex Root Canal Curvature of Bilateral Radix Entomolaris: Three-dimensional Analysis with Spiral Computed Tomography

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Abstract

A number of variations occur which pose a challenge to a clinician, so precise knowledge of anatomic characteristics is essential. An additional root in the permanent mandibular first molar is rare. The presence of an extra root on the lingual side of mandibular molar is known as radix entomolaris and on the buccal side is called as radix paramolaris. Endodontic treatment of these molars may be challenging compared with two-rooted molars owing to the unusual coronal and root canal morphology and need to modify the access cavity. There is not much data about the bilateral occurrence of such type of mandibular first molars. This case report describes two cases of mandibular first molar with three roots (one mesial and two distal) and four canals (two in mesial and one in each distobuccal and distolingual root) using spiral computed tomography (CT). The use of spiral CT serves as a boon in the diagnosis of complex anatomic variations.

Key words: Mandibular molar, Radix entomolaris, Spiral computed tomography

INTRODUCTION

Successful endodontic therapy depends on effective debridement and shaping of the root canal system.¹ Cleaning and shaping of root canal have been recognized as an important phase in endodontic therapy. The root canal morphology of teeth is often extremely complex and highly variable, so awareness and understanding can thus contribute to the successful outcome of the root canal treatment. Therefore, the primary step in root canal treatment is the identification of the internal morphology of canal system as precisely as possible so as to obtain predictable results.

Mandibular first molar can display several anatomical variations. The majority of cases have two roots and three

canals. However, cases are reported with an extra third root which is placed distolingually in most of the cases.^{2,3} The additional third root in permanent mandibular first molar variants has 3rd roots that are typically distributed distolingually. This additional root was first described in the literature by Carabelli⁴ and is called the radix entomolaris (RE).⁵ The frequency of RE is <5% in Caucasian, African, Eurasian, and Indian populations,⁵ whereas its bilateral occurrence is <2.19%.⁵ This additional root is typically smaller than the distobuccal root and is usually curved, requiring proper attention during cleaning and shaping procedures.⁶

Spiral computed tomography (CT) is a non-invasive technique to determine the occurrence of distolingual root and advantages of CT is that it can render cross-sectional (cut plane) and three-dimensional images that are highly accurate, high resolution, fully quantifiable, provide repeatable results and avoids the potential of a radiographic or photographic transfer error. Spiral CT is capable of providing sub-millimeter resolution in images of high diagnostic quality, with short scanning times (10-70 s), radiation dose is 15 times lower than those of conventional

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scans. Spiral CT shows the exact position of the distolingual root, and hence, it helps in determining the curvature and prevents the iatrogenic event that might occur in relation to canal curvatures such as instrument breakage, perforation, and ledge formation.

CASE REPORTS

Case 1

An 18-year-old male patient reported to the department with the chief complaint of swelling in lower left the back region for last 2 days as well as pain in a lower right back. The pain was aggravated on taking cold and hot food items and on mastication. The clinical examination revealed the decayed right and left mandibular first molars. His medical history was non-significant.

RVG of 36 1revealed deep carious lesion involving the pulp with periapical radiolucency at the root apices and presence of an additional root in 36. On close inspection of the radiograph of left mandibular molar, an impression of double periodontal ligament space on distal side leads to the suspicion of additional root entity with 46. Based on the clinical and radiographic examination, diagnosis of the acute apical abscess with 36 and symptomatic irreversible pulpitis with acute apical periodontitis of 46 was established.

After adequate anesthesia and isolation with the rubber dam, access cavity was prepared using endo access kit in the mandibular left first molar. The access design is slightly modified using ultrasonic tips for exploring additional distal canal orifice. CT imaging had shown the severe curvature from the middle third to the apical third in the distolingual root; therefore, the canals were negotiated with Pathfinder .02 rotary NiTi files till the working length, and they glide through the canal and pasts the curvature smoothly. Instrumentation is completed with 0.04 tapered number 35 NiTi rotary instruments in a crown down fashion till the working length. All the canals were irrigated with 2.5% sodium hypochlorite and 17% ethylenediaminetetraacetic acid. Calcium hydroxide was placed into the canals as the intracanal medicament. After one week, the tooth was asymptomatic, and final irrigation was done with passive ultrasonic irrigation for 1 min. Canals were dried using paper point and obturated by gutta-percha and AH Plus sealer. Later, the access cavity was sealed with composite.

After completion of 36, endodontic treatment of the mandibular right first molar is started. After checking the patency, cleaning and shaping using controlled memory NiTi instruments are done. The canals are irrigated with

2.5% NaOCl and normal saline. Calcium hydroxide was used as the intracanal medicament, and access opening was sealed with temporary cement. One week later, the tooth was asymptomatic, the canals are dried with the paper point, obturation is completed, and access cavity is sealed with composite (Figures 1-4).

Case 2

A 21-year-old male patient was referred to the Department of Endodontics, with pain in 46. Medical history was non contributory. Clinical, radiographic and pulp testing examination revealed that tooth was symptomatic and patient requires endodontic treatment. The preoperative radiograph revealed the presence of an additional root then CT scan

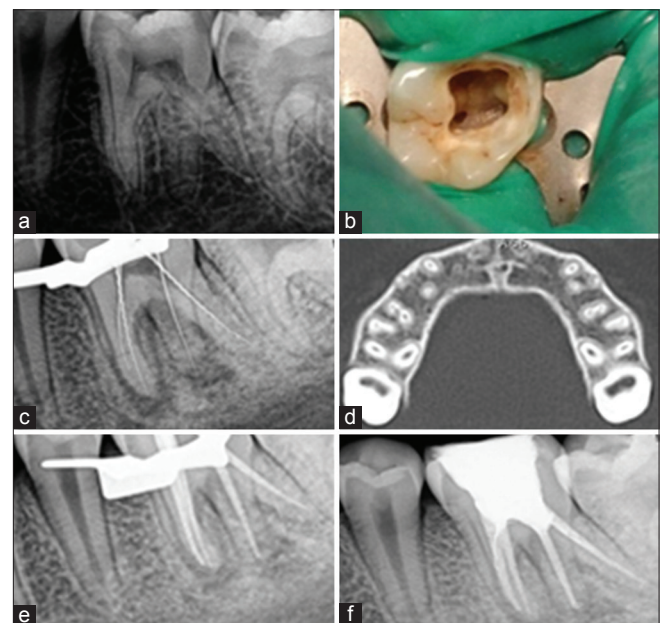


Figure 1: (a) Pre-operative, (b) access opening, (c) working length, (d) spiral computed tomography, (e) master cone, (f) obturation

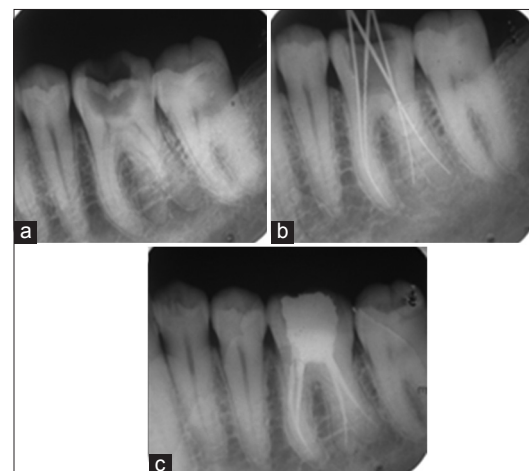


Figure 2: (a) Pre-operative, (b) working length, (c) obturation

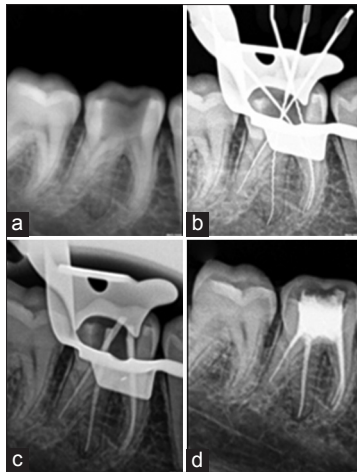


Figure 3: (a) Pre-operative intraoral periapical of 36, (b) working length, (c) master cone, (d) obturation

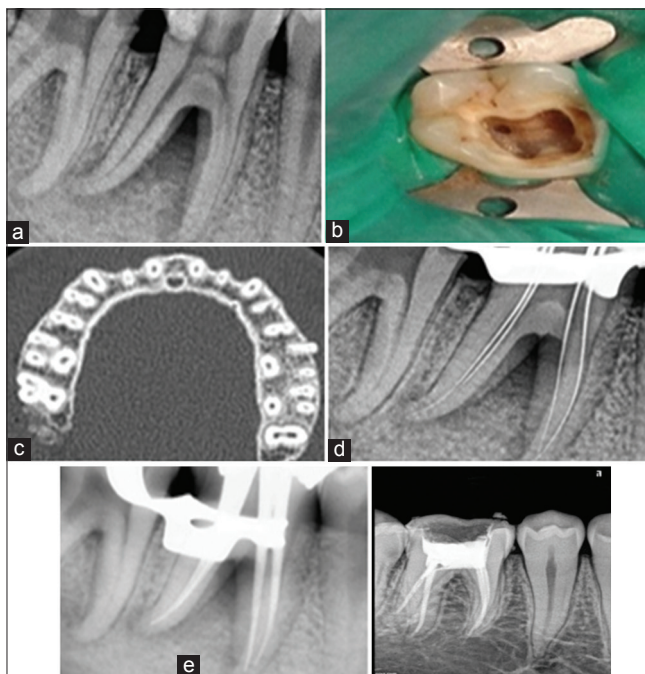


Figure 4: Pre-operative intraoral periapical of 46, (a) Pre-operative, (b) access opening, (c) spiral computed tomography, (d) working length, (e) master cone

was planned. After obtaining the informed consent from the patient, CT scan of the mandible was done and processed using Dentascan, Dental Software (GE healthcare, USA). CT imaging had shown the severe curvature from the middle third to the apical third in the distolingual root. Anesthetizing the tooth, a conventional endodontic access opening was made and then slightly modified by using ultrasonic tips for exploring additional distal canal orifice.

The working length of each canal was estimated by means of an apex locator (Root ZX: Morita, Tokyo, Japan), and confirmed with intra oral periapical radiograph. The canals were initially instrumented with #15 nickel titanium files

(Dentsply Maillefer) under irrigation with 3% sodium hypochlorite and 17% EDTA. Coronal flaring was carried out by using Gates Glidden drills (number 3 and 2 Dentsply Maillefer). Cleaning and shaping were done using hand nickel titanium file system (Dentsply Maillefer). The canals were obturated with AH plus resin sealer and gutta-percha points using lateral condensation technique and tooth was restored with a posterior composite filling.

DISCUSSION

The success of endodontic therapy depends on the root canal morphology to some extent, so the clinician should have a thorough understanding of normal anatomy as well as its unusual anatomical configurations. The mandibular permanent first molars have several typical anatomical features and anomalies. The presence of four canals is relatively frequent,⁶ but the presence of two distal roots is uncommon, and the bilateral presence of three-rooted mandibular molars is a rare case. This additional third root first mentioned in the literature by Carabelli (1844).¹ The coronal third of distolingual root of RE is fixed partially and completely to the distal root. Based on buccolingual orientation, De Moor *et al.*⁷ have classified RE into three types. Type I refers to straight root or canal. Type II refers to an initially curved entrance which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third. In this case, a distolingual root of 36 is classified as Type III because severe canal curvature is present in middle third till the apical end. The distolingual root of RE is mostly in the buccolingual plane as in conventional radiography (two-dimensional); tooth is visualized in the mesiodistal plane only. The scope of spiral CT is becoming broader day by day in ascertaining the exact location and anatomy of RE.

The position of distolingual canal orifice has an implication for access cavity preparation. The orifice of RE is located far distally; hence, the modification of the classical triangular access cavity to a trapezoidal form is required to identify the extra orifice and establish the straight-line access. The inner orifice distance between an extra distolingual canal and remaining canals can be measured with cone beam CT (CBCT), serving as a useful guideline to locate and treat RE.^{5,8} The axial sectioning of CBCT allows for the exact visualization of a distolingual orifice in relation to about other canals. Ultrasonic tips help in careful removal of dentin and thus prevent weakening of tooth structure.⁹

The determination of root canal curvature is a main procedure for endodontic planning. Knowledge of root curvature radius allows for selection of NiTi rotary files and accurate planning of root canal instrumentation. NiTi

rotary files undergo hundreds of cycles of alternating compression and flexure when placed in a curved root. The radius of curvature is the most important factor influencing the cyclic fatigue. The more severe the angle of curvature with the small radius of curvature, the greater the cyclic fatigue and thus, lower its life expectancy.¹⁰⁻¹² Instrument separation increased as a radius of curvature decreased. Thus, file design should be taken into account while selecting the NiTi rotary instrument for curved canals.¹³⁻¹⁵ In this case, flexible memory controlled NiTi files were used because they are highly resistant to cyclic fatigue and reduce the incidence of instrument breakage.

CONCLUSION

Spiral CT is a practical, non-invasive tool for morphological analysis. It also reduces the radiation dose to which patients are exposed. It helps in accurate diagnosis of the third root and can avoid complications or a “missed canal” during root canal treatment. Failing to realize curvature and radii of the canal before treatment can lead to procedural errors and which can compromise the outcome of the treatment. Additional aids that help in the location of orifices are following the law of symmetry, DG 16 probe, micro-opener, sodium hypochlorite “bubble” test, long shank burs, ultrasonic instruments, CBCT, and operating microscope.

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Atrial Septal Defect Presenting in a 70-Year-Old Woman: A Rare Case Report

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Abstract

An atrial septal defect (ASD) is a communication between the atria resulting from a deficiency of tissue in the interatrial septum. An undetected ASD with a significant shunt causes symptoms over time in late adolescence or early adulthood and majority of the patients are symptomatic by the fifth decade. There are three types of ASDs: Secundum defect, primum defect, and sinus venosus defect. Ostium secundum defect is the most common type of ASD, accounting for 50-70% of all ASDs. Here, we report a rare case of ostium secundum ASD presenting in a 70-year-old woman who was completely asymptomatic previously.

Key words: Congenital heart disease, Atrial septal defect, Ostium secundum

INTRODUCTION

Atrial septal defects (ASDs) are commonly encountered and occur in one-third of adults with congenital heart disease.¹ There are three types of ASDs: Secundum defect, primum defect, and sinus venosus defect. Ostium secundum defect is the most common type of ASD, accounting for 50-70% of all ASDs. This defect is present at the site of fossa ovalis, allowing left-to-right shunting of blood from the left atrium (LA) to the right atrium (RA). Ostium primum defects occur in about 30% of all ASDs, if those that occur as part of complete ECD are included. Isolated ostium primum ASD occurs in about 15% of all ASDs.

Sinus venosus defect occurs in about 10% of all ASDs. The defect is most commonly located at the entry of the superior vena cava (SVC) into the RA (SVC type) and rarely at the entry of the inferior vena cava (IVC) into the RA (IVC type).²

ASDs often go unrecognized for the first 2 decades and initial diagnosis in adulthood is common. Although patients survive into adulthood, life expectancy is not

normal in unrepaired patients, with mortality increasing by 6% per year after age 40 years. Progressive symptoms of dyspnea on exertion and palpitations frequently occur in adulthood and are caused by increasing right-sided chamber enlargement, pulmonary hypertension, RV failure, tricuspid regurgitation, and atrial arrhythmias.¹ Hereby, we report an unusual case of ostium secundum ASD presenting in a woman at the advanced age of 70 years.

CASE REPORT

A 70-year-old female presented with a history of exertional breathlessness since 5 months, swelling of both lower limbs since 3 months, cough with expectoration since 1 month. The patient had no complaints before the last 5 months. She did not have any comorbidities, nor did she have a history of the previous hospitalization. On examination, her pulse rate was 88 beats per minute, regular in rhythm. Blood pressure was 130/90 mm Hg. Pitting pedal was present and Jugular venous pressure was raised.

On cardiac examination, inspection revealed a parasternal heave and epigastric pulsation which were confirmed by palpation. Palpable P2 was also felt. On auscultation, a wide and fixed splitting of S2 was heard along with a loud P2. A grade 3 pansystolic murmur was present in the mitral and tricuspid areas.

Chest X-ray revealed cardiomegaly with a right ventricular type of apex and a prominent pulmonary artery (Figure 1).

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Electrocardiography showed right bundle branch (Figure 2). A transthoracic echocardiography was done which showed an ostium secundum ASD measuring 3.5 cm with a left to right shunt. The RA, right ventricle and left ventricle were dilated (Figure 3). Moderate tricuspid regurgitation and mild mitral regurgitation with anterior mitral leaflet doming were noted. Moderate pulmonary artery hypertension of 50 mm Hg was present. Ejection fraction was 59%.



Figure 1: Chest X-ray showing cardiomegaly and prominent pulmonary artery

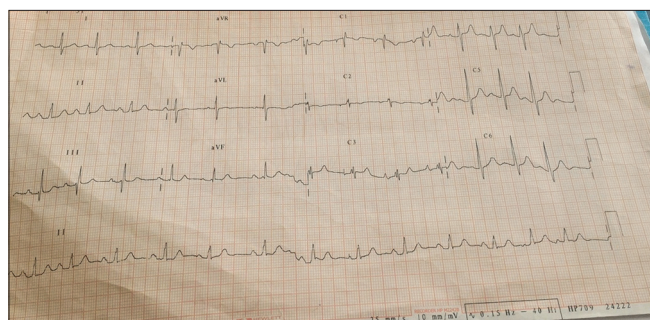


Figure 2: Electrocardiogram showing right bundle branch block

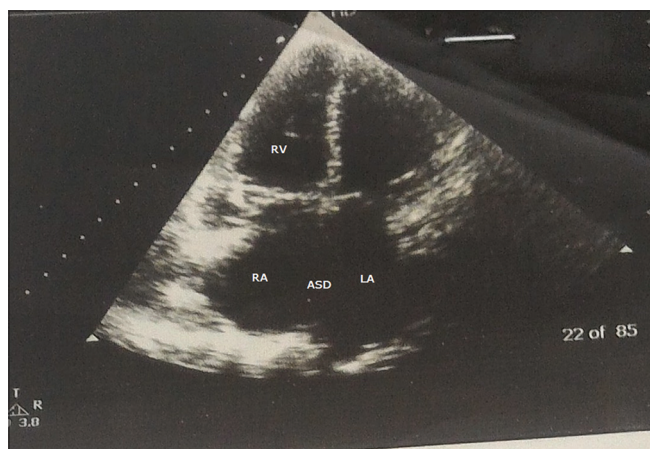


Figure 3: Transthoracic two-dimensional echocardiography showing ostium secundum atrial septal defect with dilated right atrium, dilated left atrium and dilated right ventricle

The patient was advised device closure of ASD but was unwilling to undergo the procedure. Hence, the patient was treated symptomatically with diuretics.

DISCUSSION

About 90% of patients with untreated ASD are symptomatic by the age of 40 years.³ In a study conducted by Campbell⁴ death was reported in three quarters of patients with untreated ASD by 50 years of age and in 90% by 60 years of age. The case reported by us is noteworthy because the patient survived until the age of 70 years without any symptoms.

Very few cases of ASD presenting for the first time after 65 years of age have been reported in literature. Diaconu reported a case of ostium secundum ASD presenting in a woman after the age of 70 years.⁵ The case reported by Diaconu had complications such as severe pulmonary hypertension, cardiac failure, and atrial fibrillation.

ASD of the secundum type with pulmonary hypertension was reported in a 86-year-old woman by Tozzini *et al.*⁶

Studies have been conducted to evaluate the benefits of ASD closure in the elderly. Komar *et al.* concluded that transcatheter closure of ASD in the elderly (>60 years) caused significant clinical and hemodynamic improvement which was maintained during long-term follow-up, thus justifying this procedure in old age.⁷ Khan *et al.* also demonstrated that ASD closure in advanced age (median age 70 years) resulted in favorable cardiac remodeling and improvement in functional age.⁸

Yalonetsky and Lorber also demonstrated an improvement in exercise capacity and right ventricular size following ASD closure in elderly (>60 years).⁹ Hence, the importance of diagnosis and treatment of ASD in elderly is reflected from the above studies.

CONCLUSION

In elderly patients presenting with exertional breathlessness, ischemic heart disease is the most frequent diagnosis made. However, congenital heart disease like ASD can produce symptoms for the first time in the elderly, albeit rarely and can easily be overlooked. It is important to be aware of the possibility of ASD presenting at an advanced age as timely diagnosis and closure of ASD has been proved to be beneficial in this age group as well.

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