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International Journal of Scientific Study

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International Journal of Scientific Study
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Contents

ORIGINAL ARTICLES

Correlation between Coronary Angiography and Impedance Cardiography
Bhabani Prasad Chattopadhyay, Rammohan Roy, Kalyan Kumar Saha, Nasim Mandal, Ashok Rathore 1

Sevoflurane versus Isoflurane in Patients Undergoing Valvular Heart Replacements: A Comparative Study
Malkhan Singh, Indu Verma, Deepak Meena, C K Vyas 6

Knowledge and Attitude of Basic Life Support in the Community of Dammam City, Saudi Arabia
Ahmed A Alazmi, Fayez A Alzahrani 14

To Compare the Efficacy of Tamsulosin and Deflazacort Combination with Tamsulosin Alone in Expulsion of Lower Ureteric Stones in a Medical College in South Haryana
Kanwar Singh Goel, Ramendranath Talukdar, Pawan Tiwari 19

Clinical and Angiographic Profile of ST-elevation Myocardial Infarction in Premenopausal Women
R R Saravanan, N Vijayasarathy, S R Veeramani, S Balasubramanian, G Selvarani, G S Sivakumar, R Ramesh 25

Beliefs and Practices of Tribal Pregnant Women toward Foods in Alipurduar District of Eastern India
Riya Mandal, Neeru Bala, Dipak Kumar Bose 28

A Comparative Study of Chest X-ray and Chest High-resolution Computed Tomography in Blunt Trauma Chest Patients
Sharad Kumar Sahu, Ashish Singh, Atul K Singh, Lal Mani Singh, Mahendra Veljibhai Khanpara, Mayank Jeswani, K Sureshkumar 31

Decadal Change in Mortality Pattern of Surgical Patients – A Study in Government Tertiary Care Hospital in Vindhya Region
Mahendra Veljibhai Khanpara, Vishnu Kumar Patel, A P S Gaharwar, Sharad Kumar Sahu 35

Serum Albumin Levels in Patients with Dengue Fever – A Longitudinal Study
T Bhagyanath, Jacob K Jacob 40

Clinical Study on Findings of Ultrasound and Computed Tomography Scan in the Diagnosis of Ovarian Mass Lesions
M Sunil, M M Mishal Mohammed 44

International Journal of Scientific Study
January 2020 • Vol 7 • Issue 10

A Clinical Analysis of Acute Small Bowel Obstruction – A Review of Sixty-four Patients in a Tertiary Hospital
M R Raman, E J Samuel 49

Pregnancy Outcome in Women with Sickle Cell Hemoglobinopathy and Normal Hemoglobin – A Case–Control Study
Neha Harne, Anuja Bhalerao, Krutika Bhalerao 54

A Clinical Study on Post-operative Outcome in Perforation Peritonitis Patients with Reference to the History of Nonsteroidal Anti-inflammatory Drugs Use
Mayank Jeswani, Mukund Pandey, Atul K Singh, Lal Mani Singh, K Sureshkumar, Sharad Kumar Sahu, Tarun Jeswani 59

Cardiovascular Profile of Rheumatoid Arthritis Patients and its Correlation with Disease Activity
A Prince Prabhakaran, R Periyasamy, R Nandini 63

Profile of Congenital Heart Disease in Children with Down's Syndrome Attending an Early Intervention Center in a Teaching Hospital in South India
B Vanitha, S Sangeeth, S Balasankar 68

Thyroid Profile of Patients with Non-alcoholic Fatty Liver Disease
Paul Samaresh, Bhaumik Pradip, Bhattacharya Swatilekha 72

Correlation between Three Methods of Blood Pressure Measurement (Impedance Cardiography, Sphygmomanometry, and Invasive Methods)
Bhabani Prasad Chattopadhyay, Rammohan Roy, Kalyan Kumar Saha, Nasim Mandal, Ashok Rathore 76

Prevalence of Depression and Suicidality in Schizophrenia - A Cross Sectional Study
Chris Abraham, C Jayakrishnaveni 81

Prediction of Difficult Laparoscopic Cholecystectomy Based on Clinical and Ultrasonographic Parameters
Ambuj Kumar Soni, Yogesh Kailasia, Priyank Sharma, B Y Darshan 86

Role of Magnetic Resonance Imaging in Evaluation of Perianal Fistula
Jyoti Choudhary, Lovely Kaushal, Pooja Rajput 90

A Clinical Study on Role of Coronary Computed Tomography Angiogram in the Diagnosis of Coronary Artery Disease
Jose Kuruvilla, M Sunil 95

International Journal of Scientific Study
January 2020 • Vol 7 • Issue 10

A Study of Clinical Profile of Headache in Epilepsy Patients
A Thomas Edwinraj, R Nandini Alias Kiruthika 100

Study of Various Factors Which Influence the Outcome of Patients with Blunt Injury Chest
A Kumaravel, S Naveen, M Vikashini 105

Predisposing Factors and Outcome of Fournier's Gangrene
A Jeya Anand, K Dalton Jebaraj 109

Clinical Study and Management of the Incisional Hernia: A Retrospective Study
T Gnanakkumar 113

Maternal and Fetal Outcome of Cardiac Disease in Pregnancy: A Retrospective Study at Tertiary Institute
Anju Dogra, Pooja Bhagat, Sudesh Kumar, Kanik Pandita 117

Prevalence of Different Clinical Variants of Nephrotic Syndrome in Children 1–18 Years of Age in Tertiary Care Hospital of North India
Koushal Kumar, Shalika Sharma, Nikhil Gupta 121

Incidence of Apical Periodontitis and Frequency of Root Canal Treatments in Geriatric and Medically Compromised Patients in Jammu Population
Nikhel Dev Wazir, Hemanee Rathore, Deebah Choudhary 125

Functional Outcome of Complex Tibial Plateau Fractures Using Hybrid External Fixators
G A Rajmohan, M C Chinnadurai 129

Functional and Radiological Outcome of Displaced Intra-Articular Calcaneal Fractures
G A Rajmohan, M C Chinnadurai 132

Ultrasound Guided Genicular Nerve Block for Knee Osteoarthritis – Comparing Methylprednisolone and Triamcinolone with Ropivacaine- Randomized Prospective Double Blinded Study
M Balasubramani 135

Oral Fibreoptic Intubation – A Comparison of Simple Pre-Determined Length Insertion Technique (Split) With Conventional Method: A Randomized Cross-Over Study
M Balasubramani 139

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Original Article

Correlation between Coronary Angiography and Impedance Cardiography

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Abstract

Aims and Objectives: The aims of the study were to find out the correlation between coronary angiographic findings and hemodynamic parameters derived from impedance cardiography (ICG) and echo-Doppler study.

Patients, Materials and Methods: A total of 200 patients of acute myocardial infarction having chest pain, ST elevation in two or more contiguous leads of electrocardiogram (ECG), biomarker positivity, echocardiographic evidence of regional wall motion abnormality (RWMA), and coronary angiographic evidence of coronary lesions were recruited. Subjects unwilling to participate, moribund, critically ill subjects, and patients with concomitant heart failure, arrhythmia, and valvular lesions were excluded from the study. GE™ Vivid 7 Dimension machine was used for ECG-gated echo-Doppler studies. The left ventricular ejection fraction (LVEF), stroke volume (SV), RWMA, diastolic function, etc., were observed. ICG measured LVEDV, LVESV, LVEF, and other parameters particularly amplitudes of the different waves. Coronary angiography (CAG) was done in the Cath Lab having "Siemens™ Axiom Artis Zee (floor)" equipment.

Results and Analysis: Results-analysis revealed there is negative correlation (Pearson's correlation coefficient, $r = -0.8$) between augmentation pressure and coronary angiographic stenosis percentage and P value is also significant ($P = 0.034$). Pulse pressure (PP) also is positively correlated ($r = -0.78$) with coronary angiographic stenosis percentage and P value is also significant ($P = 0.027$). There is a negative correlation ($r = -0.259$) between augmentation index (AIx) and coronary angiographic lesions and that is statistically significant ($P = 0.03$).

Conclusion: There is a positive correlation between ICG -derived hemodynamic parameters and the percentage stenosis of coronary arteries. Rise of augmentation pressure and PP in the ICG waveform is associated with coronary artery disease severity. AIx is negatively correlated with severity of coronary arterial stenosis.

Key words: Artificial neural network, Augmentation index, Coronary angiography, Impedance cardiography, Left ventricular ejection fraction, Left ventricular end-diastolic volume, Left ventricular end-systolic volume, Regional wall motion abnormality, Stroke volume

INTRODUCTION

Electrocardiogram (ECG) can detect myocardial ischemia, injury, and infarction by picking up the changes in voltage. ST-segment elevation of anterior wall is largely attributable to occlusion of the left anterior descending artery, inferior wall mostly attributable to occlusion of the right coronary artery, and lateral wall attributable to occlusion of the left circumflex artery. There are many ECG algorithms for predicting the culprit coronary artery occlusion in ST-elevation myocardial infarction patients. Impedance cardiography (ICG) another electrical instrument has also the potential of being contributory like ECG in acute myocardial infarction. However, coronary angiography (CAG) is the gold standard in identification and quantification of the coronary artery disease.

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In recent years, there is renewed interest in evaluating the role of ICG in cardiac diseases. We have also worked on ICG. The basic principles and technical details of the ICG device used were designed by Ghosh *et al.* from School of Medical Science and Technology (SMST), Indian Institute of Technology (IIT), Kharagpur, and have been discussed earlier.[1,2] Many hemodynamic parameters such as stroke volume (SV), left

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ventricular ejection fraction (LVEF), and augmentation index (AIx) can be derived from ICG waveforms. AIx is the ratio between augmentation pressure and pulse pressure (PP). Augmentation pressure is the difference between two peaks of the systolic pressure and is attributable to the contribution of the reflected wave, left ventricular ejection time, etc. PP is the difference between the systolic pressure and the diastolic pressure identified in the ICG waveform. AIx can be estimated by applanation tonometry and by ICG. Radial tonometry-derived AIx has been shown to correlate with the extent of the coronary artery disease,[3] LV hypertrophy,[4] urinary albumin excretion,[5] maximal aortic intima-media thickness,[6] cardiovascular events,[7] and all-cause mortality.[8-10] In the present work, we have studied the ICG of patients undergoing CAG (for cardiac reason) for the purpose of searching correlation between ICG and CAG.

Aims and Objectives

The aims of the study were to collect (1) hemodynamic parameters predicted by impedance cardiography (ICG) instrument and cardiac echo-Doppler studies from patients of acute myocardial infarction and (2) find out the correlation between coronary angiographic findings and hemodynamic parameters derived from ICG and echo-Doppler study.

PATIENTS MATERIALS AND METHODS

Patients

Inclusion and exclusion criteria of the diseased subjects: Inclusion criteria: Classical chest pain (angina of coronary origin), ECG changes such as ST elevation in two or more contiguous leads, biomarker positivity (CPK-MB or troponin T), and echocardiographic evidence of regional wall motion abnormality (RWMA), and coronary angiographic evidence of coronary lesions were included in the study. Exclusion criteria: Subjects unwilling to participate after knowing that ICG is an experimental tool and is not going to contribute to the treatment process were excluded from the study. Moribund, critically ill subjects, and patients with concomitant heart failure, arrhythmia, and valvular lesions were excluded from the study. Materials and Methods: GE™ Vivid 7 Dimension echo-Doppler machine was used for acquisition of ECG-gated echo-Doppler imaging. LVEF RWMA, Diastolic function. LVEDV, LVESV, LVEF, LVET, SV, etc., were recorded. ICG device used in this study was designed and developed by Ghosh *et al.* in the SMST, IIT, Kharagpur, and the details of the device have already been published in artificial intelligence in medicine.[1] Figure 1 shows that C1and C2 are excitation electrodes and R1-R2 are voltage-sensing electrodes placed on skin overlying the course of radial artery. Figure 2 shows the waveform. The waveforms were differentiated, processed to derive SV, LVEF, AIx, etc., parameters. CAG was done in our Cath Lab having "Siemens™ Axiom Artis Zee (floor)," with a power rating of 100 kW at 100 kV. The power of the X-ray generator is 100 kW, with a penetration depth of 92 cm. CAG pictures [Figure 3] thus acquired were utilized for qualitative and quantitative estimation of coronary artery disease. All the 200 subjects recruited in this study, underwent coronary angiogram due to cardiac indication. The coronary angiogram was analyzed to ascertain the location and degree of stenosis.

RESULTS AND ANALYSIS

The present study was a hospital-based cross-sectional study conducted in 200 patients admitted in the Cardiology

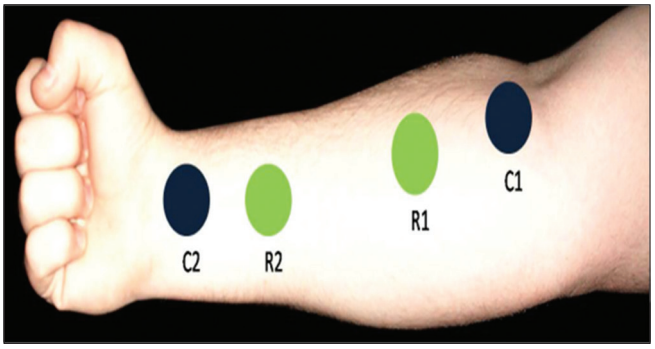

Figure 1: Electrode placement on the forearm of the subject

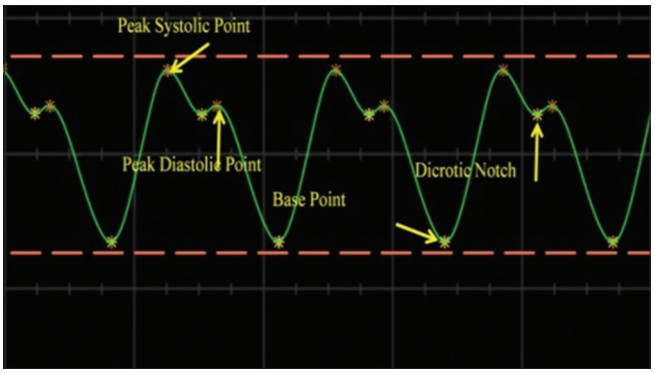

Figure 2: ICG signal after filtering

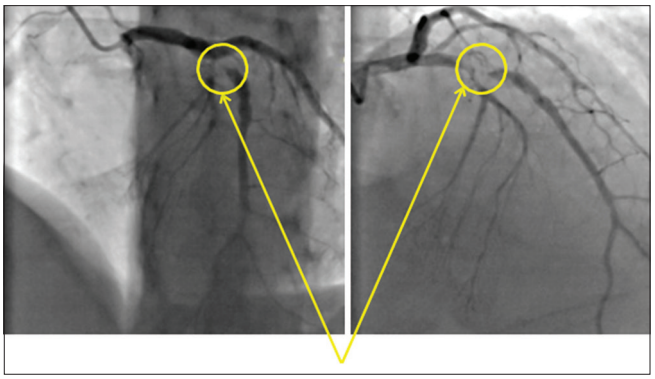

Figure 3: Coronary angiographic lesion

Department of Medical College and Hospital, Kolkata. In our study, 48% were female and 52% were male. The mean ± standard deviation (SD) age was 50.32 ± 8.125 years. Mean height (mean ± SD) was 163.85 ± 8.158 cm among the population. Mean weight and body mass index were 64.94 ± 8.348 kg and 24.1182 ± 3.11, respectively. The mean BSA of patients was 1.7073 ± 0.1269. Among the study population, 51% of patients are previously diagnosed hypertensive and 49% are normotensive. Among the study population, 35% had diabetes, either type 2 or type 1 and 65% were non-diabetic. About 29% of the study subjects were suffering from dyslipidemia. About 42% of the study population had a positive family history of diabetes. About 34% had a positive family history of hypertension and 21.6% had a history of AMI among family members. All the cases selected were having ST elevation Myocardial Infarction as evidenced by ECG. This was in consonace with inclusion criteria of patients. According to ECG in our study population, there was an involvement of wall as follows: Anerolateral in 23% of cases, anterior wall in 26%, inferior wall in 21%, anterior with inferior in 3% of cases, anteroseptal 7%, septal 3%, inferior with posterior wall 5%, inferior with RVMI in 2% of cases, global in 4%, and lateral 6%. Troponin T was positive in all cases. Among the other biochemical parameters, both of CPK and CPK-MB were elevated in 90% of cases.

DISCUSSION

Before going into the discussion of correlation between ICG and CAG, some basic facts about ICG will be reviewed. ICG is a relatively new tool, yet to be widely utilized. ICG can give information about the function of the heart. Kubicek *et al.*[3] were the pioneer to introduce ICG for measuring cardiac output (CO) and body fluid composition in 1966. ICG measures the ionic conduction of human body depending on the variation of impedance or resistance. When alternating current is injected to the tissue overlying a vessel, the ease or resistance to the flow of current depends mainly on the instantaneous impedance attributable to the blood within the artery and the impedance depends less on the tissues surrounding the artery. Blood contains electrolytes and charged particles or ions. Blood flows through arteries. This arterial flow is pulsatile in nature. There is variation or change in the volume of blood in the arteries in respect of time and that is attributable to the systole and diastole. Variation of blood volume results in variation of quantity of charged particles or ions in a given segment of vessel under study in respect of time. This variation of volume and hence the quantity of ions results in variation of impedance (to the current injected from outside by the ICG device). This variation of volume of arterial blood within a specific part of the body in respect of time is deemed responsible for variation of the static and transient values of electrical conductivity. Before Kubicek, the variation in impedance (ΔZ) obtained due to the pulsatile, peripheral blood flow of limbs has been mathematically related to the pulsatile change in volume by Nyboer *et al.*,[4] 1950.

Vessels are considered as volume conductors. Majority of initial researchers worked on thoracic impedance plethysmography and the volume changes in aorta and inferior vena cava were studied in great detail. Vessel segment in the limbs has also been studied and by application of transfer function central aortic waveforms, pulse-wave velocity has been derived by many workers. In this connection, it is necessary to emphasize the importance of the rate of change of impedance (dz/dt) and the maximum rate of change of impedance (dz/dt_{max}).

Both bipolar and tetrapolar electrodes have been used for research. In case of tetrapolar electrodes as used in our study, low-intensity high-frequency steady current is injected through outer two electrodes (C1-C2) and the receiving of the signal of variation of impedance (dZ) at the electrode-skin as well as tissue-vessel interface is acquired by the inner two electrodes [R1-R2 of Figure 1]. The signal so acquired from a segment of vessel under study is processed and filtered. Demodulation and differentiation of the signal thus acquired are followed by the extraction of the features. The ICG signal thus acquired resembles conventional aortic pulse waveform (obtained by direct invasive transaortic measurement/or non-invasive applanation tonometry of peripheral arteries) in many ways. The extracted features of ICG waveform are broadly categorized into four major types: Pressure features, time features, area features, and amplitude features. Algorithm deployed in the ICG device is usually designed in such a way so that it detects only the complete cardiac cycles and discards incomplete cardiac cycles. Feature points such as peak systolic point, dicrotic notch, peak diastolic point, and baseline point are of paramount importance [Figure 2]. The difference between the first two peak values may be termed as augmented pressure which is attributable to reflected wave and LVET. The PP is the difference between systolic and diastolic pressures. The ratio between augmented pressure and PP is called AIx. The differentiated ICG waveforms may be used to extract many other remaining feature points such as SV and LVEF. SV is the absolute volume of blood ejected by concerned ventricle during systole and CO is the product of SV and heart rate. Applanation tonometry has been widely used in assessment of pulse-wave velocity, central aortic waveforms, and AIx. ICG has also been used in the assessment of hemodynamic parameters. However, studies on correlation between ICG and applanation tonometry in the measurement of pulse-wave velocity[11] despite being limited in number reveal that they are in good agreement with each other. Radial

Table 1: Correlation between coronary angiography and echo-derived hemodynamic parameters

Hemodynamics	r and *P* values	Coronary Angiographic Stenosis Percentage			
		Left anterior descending artery	Right coronary artery	Left circumflex artery	Left main coronary artery
Echo left ventricular ejection fraction	Pearson correlation	+0.110	+0.016	+0.32	+0.209
	P-value	0.275	0.876	0.749	0.037
Echo stroke volume	Pearson correlation	+0.269	+0.218	+0.456	+0.014
	P-value	0.007	0.029	0.001	0.04

Table 2: Correlation between coronary angiography and ICG-derived hemodynamic parameters

Hemodynamics	r and *P* values	Coronary Angiographic Stenosis Percentage			
		Left anterior descending artery	Right coronary artery	Left circumflex artery	Left main coronary artery
ICG left ventricular ejection fraction	Pearson correlation	+0.075	+0.102	+0.189	±178
	P-value	0.041	0.04	0.049	0.076
ICG stroke volume	Pearson correlation	+0.15	+0.306	+0.325	+0.058
	P-value	0.008	0.002	0.001	0.04

Table 3: Correlation (r) between coronary angiographic lesion site (s) and ICG-derived augmentation pressure, PP, and augmentation index

Parameters	r and *p*	Left main coronary artery	Left anterior descending artery	Left circumflex artery	Right coronary artery
Augmentation pressure (peak 1-peak 2)	r	−0.8	−0.9	−0.8	−0.9
	p	0.034	0.029	0.036	0.0198
PP (SBP-DBP)	r	+0.78	+0.69	+0.86	+0.883
	p	0.027	0.047	0.06	0.021
Augmentation index augmentation index (P1-P2)/(PP)	r	−0.259	−0.42	−0.63	−0.204
	p	0.03	0.048	0.021	0.04

PP: Pulse pressure

tonometry-derived AIx has been shown to correlate with the extent of the coronary artery disease,[7] LV hypertrophy,[8] urinary albumin excretion,[9] maximal aortic intima-media thickness, cardiovascular events,[9] and all-cause mortality[10,12,13] SV has been estimated by ICG by previous workers as well.[14] In the present study, Table 1 reveals that there is a negative correlation (Pearson's correlation coefficient, *r*) between percentage of coronary angiographic stenosis and the echo-Doppler-derived hemodynamic parameters such as stroke volume ($r = -0.269$ and $P = 0.007$) and left ventricular ejection fraction ($r = -0.110$ and $P = 0.275$) and *P* values are significant. Table 2 reveals that similarly, there is a negative correlation and *P* values are also significant between the percentage of coronary angiographic stenosis and the ICG-derived hemodynamic parameters such as stroke volume ($r = -0.15$ and $P = 0.008$) and left ventricular ejection fraction ($r = -0.075$ and $P = 0.041$). Table 3 reveals that there is a positive correlation (Pearson's correlation coefficient, $r = +0.8$) between augmentation pressure (P1-P2) and coronary angiographic stenosis percentage and *P* value is also significant ($P = 0.034$). PP also is positively correlated ($r = +0.78$) with coronary angiographic stenosis percentage and *P* value is also significant ($P = 0.027$). There is a negative correlation ($r = -0.259$) between AIx and coronary angiographic lesions and that is statistically significant ($P = 0.03$). The AIx of the subjects with angiographically proved coronary artery disease ranged between −1.65 and +1.24. Higher the value of ICG-derived AIx, worse is the status of the coronary artery disease.

CONCLUSION

There is a positive correlation between ICG-derived hemodynamic parameters and the percentage stenosis of coronary arteries. Rise of augmentation pressure and pulse pressure in the ICG waveform is associated with coronary artery disease severity. However, AIx is negatively correlated with severity of coronary arterial stenosis, i.e., as there is increase in the percentage stenosis of coronary lesions and increase in the number of coronary arteries involved, the AIx is increased. However, further large-scale studies are required to explore the potential of ICG.

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Original Article

Sevoflurane versus Isoflurane in Patients Undergoing Valvular Heart Replacements: A Comparative Study

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Abstract

Introduction: Sevoflurane is a volatile anesthetic agent, which is non-irritant with low solubility and lack of arrhythmogenicity, which makes it an ideal agent for ambulatory anesthesia. The aim of our study is to compare the cardiovascular effects at equivalent minimum alveolar concentration (MAC) doses and the recovery profile of sevoflurane and isoflurane, in patients undergoing valvular replacement surgery.

Materials and Methods: This is a hospital-based, randomized, interventional, comparative study with sample size of seventy participants divided into two groups. Group A (35) received sevoflurane (1MAC) and Group B (35) received isoflurane (1MAC). Patients were of the American Society of Anesthesiologists Grade 2–4. The age group was 20–25 years with body weight of 30–65 kg, undergoing valvular heart surgery. The primary outcomes are to compare the changes in heart rate, systolic and diastolic blood pressures, mean arterial pressure, cardiac output (CO), cardiac index, systemic vascular resistance index (SVRI), and stroke volume variable, during maintenance of anesthesia. The secondary outcomes are the time taken for eye opening on verbal commands and extubation.

Results: There was a decrease in blood pressure, CO, and SVRI with both agents (statistically insignificant, $P > 0.05$), but comparatively hemodynamics was more stable along with early recovery with sevoflurane (statistically insignificant).

Conclusions: Sevoflurane and isoflurane can safely be used for fast-track anesthesia in patients undergoing valvular heart surgery. Sevoflurane provided a better hemodynamic profile, early awakening, and extubation as compared with isoflurane, even though the difference was insignificant. Thus, sevoflurane with opioids may be preferred in patients undergoing valvular heart surgery.

Key words: Cardiopulmonary bypass, Hemodynamic profile, Isoflurane, Recovery profile, Sevoflurane, Valvular heart replacement

INTRODUCTION

Volatile inhalational agents provide protection against ischemic–perfusion injury and decrease in myocardial infarct size, thus having a cardioprotective effect.[1] They have myocardial protective effects and faster induction. The endothelial cells exposed to volatile anesthetic agents developed a pronounced resistance against cytokine-induced toxicity, consistent with a pre-conditioning-like effect.[2]

Volatile anesthetic agents are now commonly used for induction and maintenance of anesthesia in cardiac anesthesia, especially with the low solubility and non-irritating volatile agents. These agents facilitate the adequate depth of anesthesia with bispectral index (BIS) monitoring which reduces the requirement of analgesia and early extubation in cardiac intensive care units (ICUs).[3]

Sevoflurane is non-irritating, less soluble, and less arrhythmogenic which makes it an ideal agent for

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anesthesia.[4-6] The use of sevoflurane in valve replacement surgeries has been shown to reduce troponin I release and better preservation of myocardial function.[7]

Isoflurane, synthesized in 1965 by R. C. Terrell, has replaced halothane because of its many advantages.[8] It is neither hepatotoxic nor nephrotoxic and has minimal cardiovascular depressant effect.[9] Isoflurane is rapidly absorbed as well as eliminated from the body since it has low blood/gas partition coefficient.[10]

Very few studies have been published the effects of these two agents in valvular heart surgeries. The aim of our study is to compare the cardiovascular effects at equivalent minimum alveolar concentration (MAC) doses and the recovery profile of sevoflurane and isoflurane in patients undergoing valvular heart replacement surgery.

MATERIALS AND METHODS

This is a hospital-based, randomized, interventional, comparative study. The patients belong to the American Society of Anesthesiologists Grade 2–4, between the age group of 20 and 50 years with body weight of 30–65 kg of either sex undergoing valvular heart surgeries and on the same cardiac medications were included. Patients having compromised renal and pulmonary status, having Hb < 10 g%, fitting in the difficult intubation category, with diabetes mellitus, obesity, coagulation disorder, left ventricular ejection fraction (LVEF) < 40%, and with severe cardiac arrhythmias were excluded from the study. Written and informed consent was obtained from all the patients.

A total of seventy patients were enrolled in the study and were randomly allocated into two groups (35 patients in each group).

Group A: Those who received sevoflurane (1 MAC)

Group B: Those who received isoflurane (1 MAC)

Randomization was done by chit in box method [Flowchart 1].

All patients had arterial and central venous cannulation under local anesthesia and Flow trac Edwards EV 1000 continuous cardiac output (CO) monitor was connected. Intravenous fentanyl 2 μg/kg was administered, and after a period of 5 min, baseline data in the form of heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), central venous pressure (CVP), CO, cardiac index (CI), systemic vascular resistance index (SVRI), and stroke volume variation (SVV) were recorded.

After pre-oxygenation with 100% oxygen for 3 min, induction was done with injection midazolam 0.05 mg/kg, injection fentanyl 4 μg/kg, injection etomidate 0.3 mg/kg, and injection rocuronium bromide 1 mg/kg intravenously to facilitate tracheal intubation. Anesthesia was maintained with sevoflurane or isoflurane depending upon the group. Further top up was done with 2 μg/kg/h of fentanyl and vecuronium 2 μg/h until the completion of surgery. BIS was maintained in between 40 and 60.

HR, SBP, DBP, MAP, CVP, CO, CI, SVRI, and SVV were noted at 2 min after induction, at sternotomy, before cardiopulmonary bypass (at aortic cannulation), after bypass (just after coming off cardiopulmonary bypass Cardiopulmonary bypass (CPB), after protamine, and before shifting to ICU.

The primary outcomes were to compare the changes in HR, SBP, DBP, MAP, CO, CI, SVRI, and SVV during maintenance of anesthesia by these two inhalational agents before shifting the patients to cardiac surgery ICU. The secondary outcomes included the recovery characteristics which were time taken for eye opening on verbal commands and extubation [Flowchart 2].

Statistical analysis was done using Student's "*t*"-test and paired "*t*"-test. For significance, *P* value was calculated and $P > 0.05$ was considered as not statistically significant and $P < 0.05$ was considered as statistically significant.

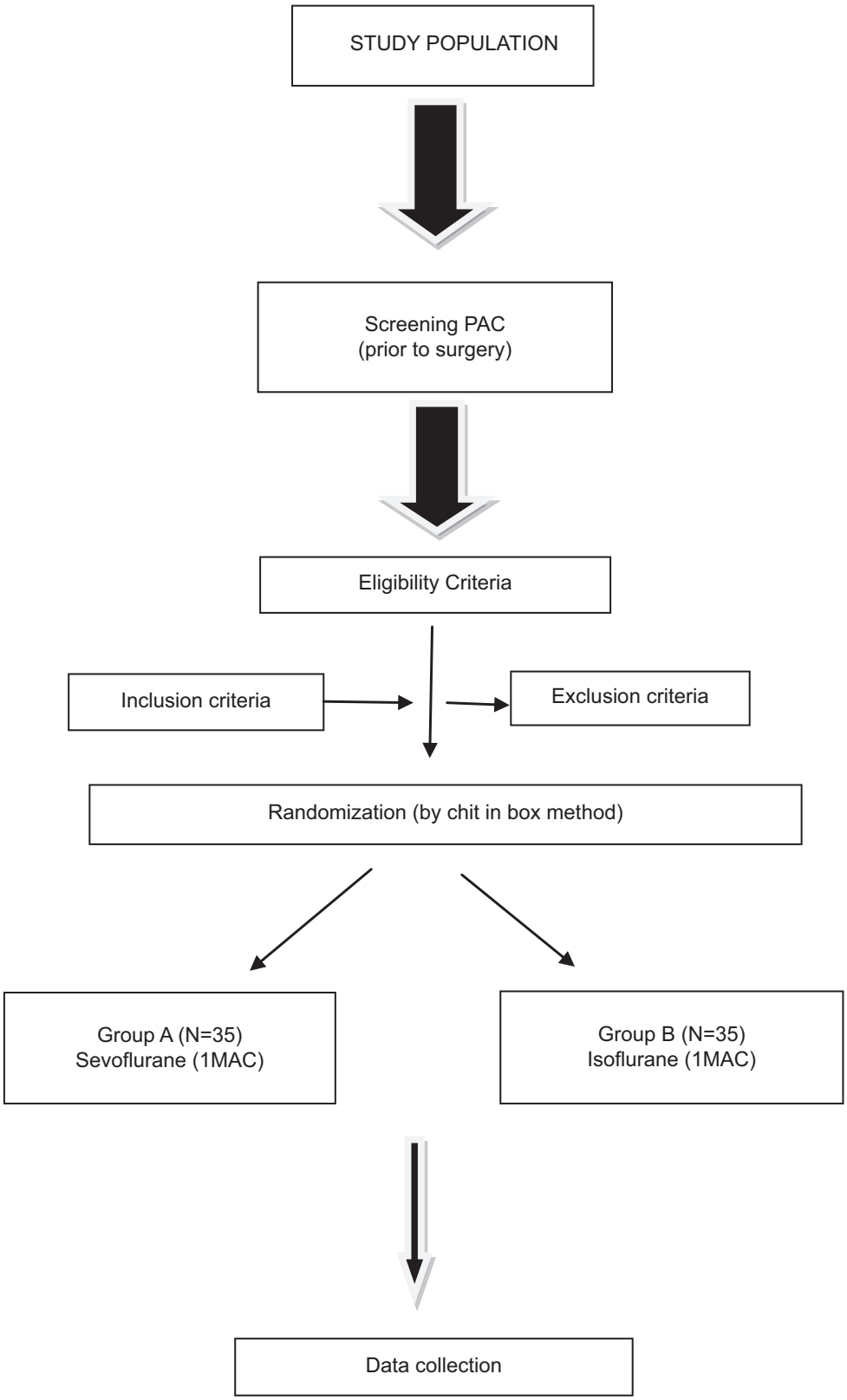
This study received ethical approval (Ethics Committee No. 2265/MC/EC/2016) from the Ethics Committee of SMS Medical College and attached hospital, Jaipur, Rajasthan on March 29, 2016.

RESULTS

A total of seventy participants were enrolled in the study, who were divided into two groups. Group A received sevoflurane and Group B received isoflurane. In Group A, the mean age of participants was 37.9 ± 8.6 years, and in Group B, it was 39.1 ± 9.1 years. In Group A, the mean weight of participants was 46.5 ± 7.0 kg, and in Group B, it was 47.7 ± 7.8 kg. In Group A, the mean height of participants was 163.5 ± 4.5 cm, and in Group B, it was 164.5 ± 5.4 cm. The mean LVEF in participants of Group A was 57.1 ± 4.6% and in participants of Group B, it was 55.8 ± 6.2% [Table 1]. HR, SBP, DBP, mean arterial blood pressure (MABP), CO, CI, and SVRI were compared in both groups at different intervals [Table 2].

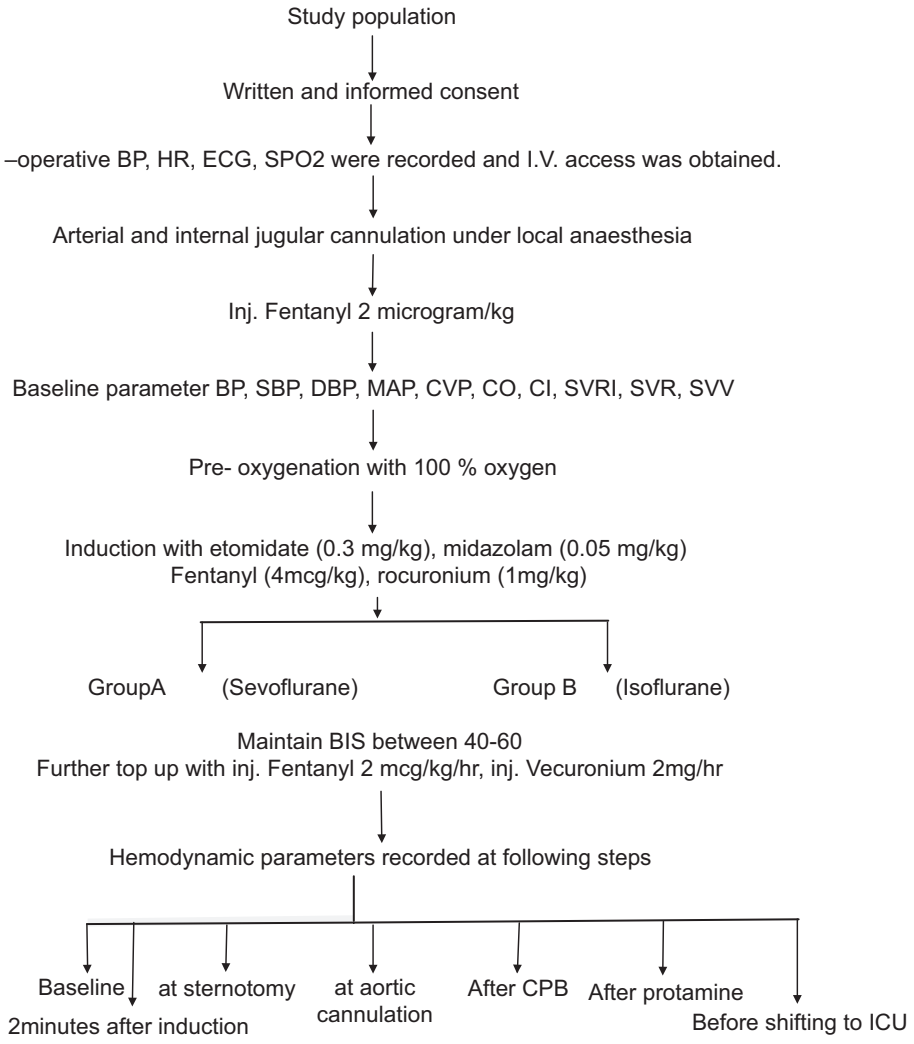
HR

Basal HR in Group A was 87.6 ± 19.5 beats/min and 95.7 ± 16.0 beats/min in Group B with $P > 0.05$. Before



Flowchart 1: Summarized chart of materials and methods

sifting to cardiac surgery ICU, the HR was 92.4 ± 11.2 in Group A and 98.5 ± 11.8 beats/min in Group B. The HR tended to be higher in isoflurane group as compared to the sevoflurane group at all time intervals, even though



Flow Chart 2: Methodology

Table 1: Demographic profile

Factors	Group A		Group B		*P-value*
	Mean	SD	Mean	SD	
Age (y)	37.9	8.6	39.1	9.1	0.5723
Weight (kg)	46.5	7.0	47.7	7.8	0.5221
Height (cm)	163.5	4.5	164.5	5.4	0.4151
LVEF (%)	57.1	4.6	55.8	6.2	0.3164

LVEF: Left ventricular ejection fraction, SD: Standard deviation

the difference was found to be statistically insignificant ($P > 0.05$).

SBP

Baseline SBP in Group A sevoflurane was 120 ± 13.7 mm Hg and in the isoflurane group, it was 117.3 ± 14.3 mm Hg. Two minutes after induction, it came down to 101.8 ± 16.2 in Group A and 104.5 ± 15.5 in Group B. In both the groups, there was a significant fall in SBP from baseline at 2 min after induction, at aortic cannulation, just after CPB, after protamine, and just before shifting to ICU. The mean SBP did not fall below 90 mmHg at any time interval.

DBP

The baseline DBP was 65.5 ± 9.1 mmHg in Group A and 63.0 ± 12.2 mmHg in Group B. Just before shifting to ICU, it was 58.3 ± 13.6 mmHg in Group A and 55.7 ± 12.2 mmHg in Group B with $P > 0.05$ which was statistically insignificant.

MABP

The baseline MAP in Group A was 83.8 ± 8.2 and 81.1 ± 10.6 mmHg in Group B. It decreased to 77.0 ± 11.1 in Group A and 74.1 ± 10.4 in Group B just before shifting to ICU which was statistically insignificant with $P > 0.05$. Although there was a significant fall in MAP from baseline in both groups at aortic cannulation, just after CPB, after

Table 2: Comparison of study parameters

Parameters	Baseline		2 min. After induction		At sternotomy		At aortic cannulation		Just after CPB		After protamine		Just before shifting to ICU	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
Heart rate (beats/min)	87.6±19.5	95.7±16.0	90.7±19.0	96.5±18.1	90.0±15.9	98.9±18.9	91.8±19.9	94.1±17.9	94.9±14.8	98.8±14.1	93.8±13.6	96.9±11.8	92.4±11.2	98.5±11.8
MAP (mmHg)	83.8±8.2	81.1±10.6	74.0±13.2	75.2±11.2	83.5±12.7	83.7±12.6	68.8±12.0	71.2±13.0	66.0±11.5	68.9±10.0	71.0±10.8	69.5±7.4	77.0±11.1	74.1±10.4
CO	5.3±1.2	5.0±0.6	4.5±0.8	4.1±0.7	4.9±0.9	4.6±0.5	4.9±1.0	4.6±0.5	6.5±1.8	6.0±0.9	6.7±2.3	6.0±1.6	5.8±1.6	5.5±0.7
CI (L/min/m^2)	3.5±1.0	3.2±0.6	3.0±0.6	2.7±0.5	3.3±0.8	3.1±0.4	3.3±1.0	3.0±0.4	4.5±1.3	4.1±0.6	4.6±1.7	4.0±1.1	4.0±1.3	3.6±0.6
SVRI	2119.1± 353.9	2130± 248.6	1963.8± 483.1	1870.0± 188.0	2019.8± 438.2	1998.3± 260.5	1739.6± 308.9	1704.9± 279.9	1500.2± 260.4	1392.7± 22.4	1545.1± 306.4	1479.1± 257.4	1791.3± 280.9	1681.5± 209.4
SVV	12.1±5.1	12.5±3.1	12.7±5.9	11.9±3.6	12.2±5.4	11.0±3.2	12.4±5.0	11.2±3.5	9.7±4.4	8.3±4.2	8.9±4.0	8.0±2.4	10.3±4.2	9.7±2.4

MAP: Mean arterial pressure, CO: Cardiac output, CI: Cardiac index, SVRI: Systemic vascular resistance index, SVV: Stroke volume variable

protamine administration, and just before shifting to ICU, the MAP did not fall below 65 mm Hg at any time interval.

CO

The baseline CO was 5.3 ± 1.2 SD in Group A and 5.0 ± 0.6 in Group B. Although there was significant fall in CO from baseline in both the groups at 2 min after induction (4.5 ± 0.8 in Group A and 4.1 ± 0.7 in Group B), there was a significant increase in CO in both groups after CPB, after protamine administration, and just before shifting the patients to ICU. However, the difference was not statistically significant.

CI

The baseline CI was 3.5 ± 1.0 L/min/m^2 in Group A and 3.2 ± 0.6 in Group B. There was a significant fall in CI from baseline in both groups 2 min after introduction (3.0 ± 0.6 in Group A and 2.7 ± 0.5 in Group B) but was statistically not significant, $P > 0.05$. An increase in CI in both groups was observed after CPB, protamine administration, and just before shifting to ICU (4.0 ± 1.3 in Group A and 3.6 ± 0.6 in Group B). However, the difference was not significant between the two groups, $P > 0.05$.

SVRI

The baseline SVRI was 2119.1 ± 353.9 in Group A and 2130 ± 248.6 in Group B. There was a decrease in SVRI from baseline in both groups after aortic cannulation to shifting to ICU. Fall in SVRI was less in sevoflurane group as compared to isoflurane group. However, difference was not statistically significant between the two groups, $P > 0.05$.

Comparison of Recovery Characteristics

Eye opening on verbal commands was significantly earlier in sevoflurane group ($P = 0.01$) with a mean value of 39.5 min in Group A as compared to 44.9 min Group B. Extubation was also significantly earlier in the sevoflurane group with mean of 247.4 min as compared to isoflurane group where the mean time taken for extubation was 278.4 min ($P = 0.0009$) [Table 3 and Figure 1].

In both the groups, cardiac morbidity in the form of M.I. was monitored by electrocardiogram (ECG) until extubation of patient (ST depression >1 mm, appearance of new q waves). Electrocardiographically did not detect any ischemic changes in both groups.

Table 3: Comparison of recovery characteristics

Parameters	Group A		Group B		*P*-value
	Mean	SD	Mean	SD	
Eye opening on verbal command (minutes)	39.5	8.2	44.9	10.0	0.0167
Extubation (minutes)	247.4	31.4	278.4	26.3	0.0009

SD: Standard deviation

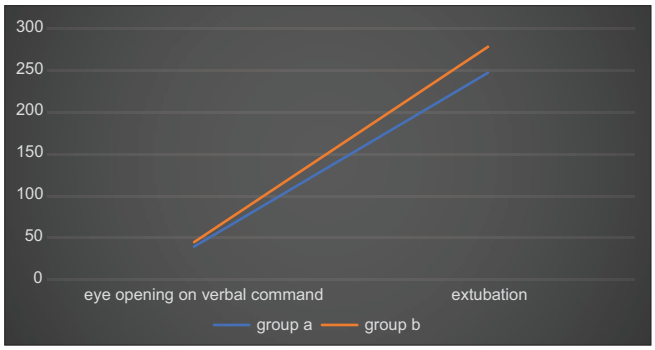


Figure 1: Comparison of recovery characteristics

DISCUSSION

The present study was aimed to compare sevoflurane and isoflurane on hemodynamic parameters and secondary outcomes in patients undergoing valvular heart replacement. Measuring the vital parameters, such as HR, SBP, DBP, MAP, CVP, CO, CI, SVRI, SVR, and SVV, at various surgical steps revealed that they were comparable (statistically insignificant, $P > 0.05$) in both groups. There was a tendency to decrease blood pressure, CO, and vascular resistance with each volatile agent, but comparatively hemodynamic parameters were more stable in sevoflurane group. However, these findings were statistically insignificant. We continuously monitored ECG which did not detect any evidence of myocardial ischemia in any of the patient.

Our study is similar to a study done by Ebert *et al.*[11] They concluded that sevoflurane provided better and stable hemodynamic profile as compared to isoflurane and desflurane. This study showed that sevoflurane did not increase the HR in adult patients. However, isoflurane and desflurane when used with higher MACs, they caused tachycardia. Sevoflurane is not associated with coronary steal phenomena and arrhythmias.

Our study data were also similar to results of Rolf *et al.*[12] as they also found that sevoflurane did not increase the HR, but isoflurane and desflurane did it at higher concentration. Sevoflurane produces less coronary dilatation than isoflurane. Sevoflurane has not been associated with a reduction of blood flow to collateral-dependent myocardium in dogs with steal-prone anatomy. Sevoflurane preserves cerebral blood flow and reduces cerebral metabolic rate much like isoflurane. However, the use of isoflurane may be associated with tachycardia which can increase the myocardial oxygen demand and can be detrimental to ischemic patients undergoing cardiac surgery. This was not observed in our study.

Similar findings were observed in a study done by Bennett *et al.*,[13] who compared sevoflurane and isoflurane, and both agents showed similar hemodynamic effects at 0.5 and 1.0 MAC. Sevoflurane decreased HR and CI as compared to isoflurane. This effect may be desirable during valvular heart replacement surgeries and also off-pump coronary artery bypass grafting (OPCABG) as myocardial oxygen consumption will be decreased with a decrease in HR. They observed that times to eye opening and extubation were similar with both agents, with sevoflurane tending to be earlier than isoflurane. These findings were not statistically significant, however.

Jones *et al.*[14] compared similar agents sevoflurane and isoflurane which we compared in our study, in cardiac surgery and concluded that sevoflurane was not inferior to isoflurane in their primary outcome, i.e., the length of ICU stay or 30 day mortality. The secondary outcomes such as cardiac troponin T sample after 6 h of surgery and serum creatinine levels were decreased in the isoflurane group as compared to the sevoflurane group. They found that there was no clinical difference between the two groups. In fact, sevoflurane was costlier (eight times) than isoflurane.

Bernald *et al.*[15] compared the effects of sevoflurane and isoflurane on cardiac and coronary dynamics in chronically instrumented dogs and concluded that sevoflurane at MAC values of 1.2 and 2 produced increase in HR. Except for HR, sevoflurane and isoflurane showed identical hemodynamic effects. They also mentioned that humans' sevoflurane would appear to be a superior anesthetic agent to isoflurane because of the faster induction emergence coupled with similar hemodynamic profile.

In a study by Xiang – Lin Yang *et al.*[16] sevoflurane had better myocardial protective effects as compared to propofol in patients undergoing valvular heart replacement. Sevoflurane did not depress the cardiac functions and showed lighter inflammatory response which provided minimal need of mechanical ventilation, period of ICU stay, and time to hospital discharge as compared to propofol.

Hemmerling *et al.*[17] studied forty patients undergoing OPCABG with high thoracic epidural analgesia and immediate extubation at the end of surgery. Sevoflurane and isoflurane gave the same cardioprotective effects as troponin T concentration was not significantly different between the two groups. There was no difference in the hemodynamic values during and after OPCABG. Sevoflurane allowed a more rapid recovery. They concluded that both agents were similar in ultra-fast-track extubation in OPCABG surgery.

Conzen *et al.*[18] conducted a prospective study to compare sevoflurane and propofol regarding their cardioprotective

property. They concluded that patients received sevoflurane for off-pump coronary vascular surgery had less myocardial injury than patients received propofol for the same intervention due to significantly lower release of troponin I during the first 24 post-operative hours. Recovery of cardiac function was also better with sevoflurane, as CO increased after revascularization with sevoflurane.

Rabie Soliman *et al*.[19] compared the myocardial effects of sevoflurane and isoflurane in high-risk patients undergoing CABG surgery and found that isoflurane increased the HR, MAP, CI, SVR, and PVR, but sevoflurane decreased the HR, MAP, CI, MAP, SVR, and PVR. Sevoflurane diminished the work performed by the heart. Thus, its use leads to low oxygen demand and improves the oxygen supply/demand ratio, therefore protecting the myocardium from ischemia. They concluded that sevoflurane is superior to isoflurane in terms of cardioprotection.

Xu J Chang *et al*.[20] suggested that isoflurane and sevoflurane can inhibit increasing of lipid peroxides levels to attenuate myocardial ischemia–reperfusion injuries mediated by oxygen-free radicals during open-heart surgery in patients undergoing cardiac valve replacement. Cromheecke S Pepermans *et al*.[7] found that the use of sevoflurane in aortic valve surgery led to better preservation of myocardium functioning and a decrease release of Troponin I. Kortekaas *et al*.[21] observed in patients undergoing mitral valve repair that intramyocardial delivery as compared to the systemic delivery of sevoflurane more strongly attenuated the systemic inflammatory response after CPB without reducing post-operative markers of myocardial cell damage. All these four studies suggest myocardial protection by inhalational agents (sevoflurane/isoflurane) by different mechanism.

The limitations of our study were that it was not blinded, and size of study population was small. Previous literatures favor that sevoflurane and isoflurane have cardioprotective property, but still there is need of more studies to prove their role in valvular heart surgeries. The study makes it possible to recognize the cardioprotective effects of sevoflurane over isoflurane.

CONCLUSION

We conclude that sevoflurane and isoflurane can safely be used for fast-track anesthesia protocol in patients undergoing valvular cardiac surgery without compromising safety. Sevoflurane provided a better hemodynamic profile in terms of BP, SVR, and CO even though the difference was not found to be significant. However, sevoflurane provides significantly early awakening and extubation as compared with isoflurane. Thus, sevoflurane along with opioids may be preferred in patients undergoing valvular heart surgery.

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Original Article

Knowledge and Attitude of Basic Life Support in the Community of Dammam City, Saudi Arabia

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Abstract

Aim: The purpose of the study was to evaluate the knowledge and attitude of the community about basic life support (BLS) living in Dammam, Saudi Arabia. Furthermore, evaluation of the limitations of training on BLS skills was another study objective.

Materials and Methods: This cross-sectional study was conducted between February 2018 and January 2019 in Dammam, Saudi Arabia. Three hundred seventy-two randomly selected individuals participated in the study. Their knowledge and attitude toward BLS was gathered through a questionnaire that got filled by interviewers. The only inclusion criteria were the age, the participant should have been at least 18 years old.

Results: The average knowledge score of a participant was 2.02 (±1.4) out of 7, where males and Saudi participants had significantly better knowledge about BLS compared to females and non-Saudi. Furthermore, significantly small number of participants had cardiopulmonary resuscitation (CPR) training. However, their attitude was more positive and they were willing to receive CPR training.

Conclusion: Attitude toward acquiring knowledge about CPR was very positive. However, their knowledge about the topic was insufficient. People should be aware of the importance of having this training and this can be done through media and social media. Knowledge about the availability of programs at nearby places can also help to motivate people.

Key words: Attitude, Basic life support, Cardiopulmonary resuscitation, Emergency, Knowledge

INTRODUCTION

Sudden cardiac arrest and accidents are the most common types of emergencies. In the United States, the sudden cardiac arrest remains a leading cause of death, and 70% of them occurred at home.[1] Outcome of out-of-hospital cardiac arrests (OHCA) remained poor at only 10.8% of survival rate after having arrest outside the hospital. In contrast, 22.3–25.5% of the patients survive and discharge if they had in-hospital cardiac arrest.[1,2]

Basic life support (BLS) is a life-saving procedure and skills which are used to save the victim from life-threatening emergencies. Scientific evidence suggests that survival rates can be improved significantly with early BLS.[3] Immediate cardiopulmonary resuscitation (CPR) can double or triple survival rates and CPR plus defibrillation within 5 min can result in survival rates between 50% and 75%.[4] There are two key factors to provide CPR successfully, (1) the presence of a person having CPR training and (2) performing the procedure at the earliest.

The likelihood of having trained individuals at the emergency spot can only be possible when there will be an adequate number of trained people in the community. An emergency can happen anytime anywhere. It can be at home, workplace or even while traveling. Hence, the chance of getting an early life support procedure depends onto have anyone near who knows the procedure. According to the World Health Organization, heart disease was the most common cause of death in the Kingdom of Saudi Arabia (KSA), and approximately 25000 people died each year because of a heart attack.[5] Furthermore, 80% of those heart attacks came at home[6] these statistics also put

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some light on the importance of having at least one family member who can give BLS.

To evaluate the knowledge and attitude, studies had been conducted in KSA.[7-9] These studies had university students and community members as well. Outcome of the studies showed the positive attitude of the participants with low level of knowledge. Studies outside the KSA also reported same positive attitude of students, teacher, and parents toward having BLS training.[10-12]

Medical and non-medical students were the most common participants in the studies conducted in Saudi Arabia during recent years.[9,13-15] A study conducted in the Eastern Province of Saudi Arabia in 2014 which invited the community to participate. However, the study evaluated the community knowledge and attitude about pediatric CPR. To the authors' best knowledge, there was no study conducted in the Eastern Province of KSA which examines the community knowledge and attitude toward BLS in general. Hence, the present study was planned and the aim was to assess the knowledge and attitude toward BLS among the community living in Dammam; furthermore, evaluation of the limitations of training on BLS skills was another study objective.

MATERIALS AND METHODS

This cross-sectional study was performed between February and June 2018 in Dammam City, Eastern Province of KSA. The sample size was calculated using the formula:

$$\text{Sample size } (N) = \frac{Z^2 \times P \times Q}{E^2}$$

Z: Confidence level = 1.96, P: Prevalence = 0.33, Q: 1–0.33 = 0.67, E: Correction factor = 0.05.

$$N = \frac{1.96^2 \times 0.33 \times 0.67}{0.05^2} = 370$$

P-value was obtained from similar previous study.[8] In the inclusion criteria, male or female adults more than 18 years of age could be participants of the study. The study was conducted at Othaim Mall located in Dammam. A random sampling technique was used to enroll the participants in the study.

The questionnaire was adopted from the previous studies after taking permission from authors[7,16] and it had five sections: (1) Demographic data, (2) CPR training status, (3) knowledge assessment, (4) attitude toward training, and (5) limitation. The first section had age, gender, nationality, and socio-economic status (SAR) of the participants. The second section asked about previous CPR training. The knowledge section contained seven questions and the next section was about the attitude which had eight questions. The last section had only one question and it was about the reason for not attending CPR training previously. All questions were closed-ended and participants invited to fill them according to their knowledge. Participation was voluntary. Data were collected through one to one interviews by the research team.

In the questions which were about knowledge, each question had one correct response. Hence, each participant had an option to select the correct answer for the questions. Therefore, the maximum possible correct answers for the knowledge section of a participant would be 7 and minimum could be 0. Hence, total possible score for a participant could vary from 0 to 7. A column was constructed during data entry which reflecting the total knowledge score for each participant.

Statistical Package for the Social Sciences v.22 was employed for data entry and analysis. In the descriptive statistics, frequency and percentages were calculated for demographic and other dependent variables. Bar graphs were constructed to present the responses for knowledge questions and scores. In inferential statistics, to study the relationship between knowledge score and demographic variables students' *t*-test and ANOVA was used.

RESULTS

A total number of participants who participated and filled the questionnaire completely was 372. Females were more responsive and their participation was higher than males, there were 218 (58.6%) females and 154 (41.4%) males in the study.

Analysis of age revealed that those who were <20 years old were 40 (10.8%), while 116 (31.2%) were between 21 and 30 years, 111 (29.8%) were between 31 and 40 years, 76 (20.4%) were 41–50 years, and 23 (6.2%) and 6 (1.6%) were 51–60 and more than 60 years old, respectively.

Study participants were mostly Saudis (70.2%, $n = 261$) and only 29.8% ($n = 111$) were non-Saudi. It was found that 54.4% of the study population was having monthly income <7000 SAR, 65 (17.5%) were earning 7 to 10,000 a month, 47 (12.6%) getting from 10 to 13,000 monthly, and rest ($n = 59$, 15.9%) were earning more than 13,000 monthly salary.

Evaluation of knowledge questions (seven questions) revealed that the average score for a participant was 2.02 (±1.4). The question with the highest proportion was "what

will you do if the patient is breathing but shows no response to verbal stimuli." About 58.9% (n = 219) responded correctly. On the other side, respondents had the least knowledge about "who is allowed to use an Automated external defibrillator AED" only 17 (4.6%) gave the correct answer. One hundred and forty-nine out of 372 (40.1%) knew the Red Crescent contact number [Figure 1a and b]. Demographic variables were also tested with knowledge score; statistics revealed that gender, nationality, SAR, and CPR training were having statistically significant relation with knowledge score [Tables 1 and 2].

Through the assessment of attitude questions, it was found that the attitude of participants, in general, was more positive. About 90.1%, n = 335 of the citizens were willing to receive CPR training, 278 (74.7%) said CPR training should be mandatory, and 92.5% said it should be part of the educational requirement [Table 3].

The most common reason for not taking CPR training previously was "not sure where to attend course" followed by "little time," "unavailability of course," was also the repeated reason for not attending the training previously.

When participants were asked that why did they not attend any CPR training previously? Out of 218 individuals who did not receive any training, 70% (n = 197) said they did not know where to attend the course. Moreover, only 3.5% and 8.2% said because of a lack of interest and cost of the course, respectively. Time and unavailability of the course were also reported as a hurdle to get trained.

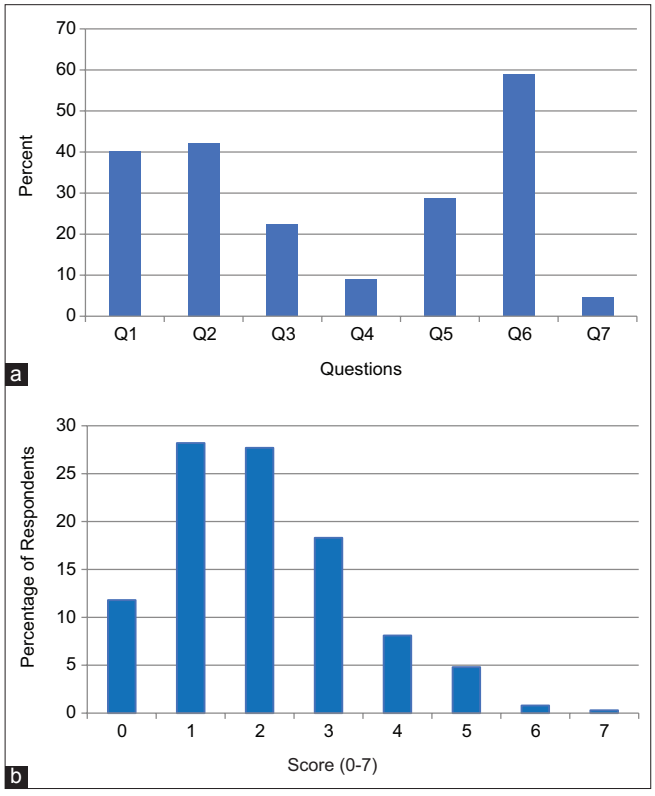

Figure 1: (a) Percentage of correct answers corresponding to each question (b) Percentage of respondents corresponding to knowledge score

DISCUSSION

CPR has significant importance to increase the chance of survival in the case of OHCA.[17-19] Higher the rate of survival if early CPR provided, hence getting BLS training has been suggested. The importance of trained BLS persons at home becomes vital in the presence of elderly at home (due to the highest probability of encountering cardiac arrest). Studies reported that BLS training increased the chances of survival in the case of emergency OHCA.[20,21] Obesity and hypertension are potential factors of cardiovascular disease. Since its increase has been reporting from Saudi Arabia, the chance

Table 1: Significance of the association between demographic factors and knowledge

Variables	*n*	Mean (SD)	*P*-value
Gender			
Male	154	2.29 (1.5)	0.001*
Female	218	1.82 (1.23)	
Age			
<21	40	1.95 (1.1)	0.762
21–30	116	2.1 (1.5)	
31–40	111	2.04 (1.4)	
41–50	76	1.91 (1.34)	
51–60	23	2.1 (0.95)	
>60	6	1.3 (0.81)	
Nationality			
Saudi	261	2.15 (1.38)	0.004*
Non Saudi	111	1.7 (1.33)	
Socio-economic status			
<4000	91	1.9 (1.3)	0.005*
4001–7000	110	1.7 (1.2)	
7001–10,000	65	1.97 (1.2)	
10001–13,000	47	2.47 (1.7)	
13001–16,000	27	2.41 (1.47)	
>16000	32	2.47 (1.4)	

*Statistically significant at 0.05 level of significance

Table 2: Relationship between CPR training and knowledge

Previous CPR training?			*P*-value
Response	***n***	**Mean (SD)**	
Yes	91	2.99 (1.4)	<0.001*
No	281	1.7 (1.2)	
Time since previous CPR training?			
Between 0 and 6 months	22	2.86 (1.7)	0.094
Between 7 and 12 months	9	3.67 (1.2)	
Between 13 and 24 months	16	3.25 (1.2)	
More than 2 years	44	2.89 (1.4)	

*Statistically significant at 0.05 level of significance. CPR: Cardiopulmonary resuscitation

Table 3: Participants attitude toward the training of CPR

Questions	*n*	Percent
Have you ever encountered a situation that required the use of CPR?		
Yes	92	24.7
No	280	75.3
(If yes) did you resuscitate the person?		
Yes	35	37.2
No	59	62.8
Would you like to receive CPR training?		
Yes	335	90.1
No	37	9.9
If you want more CPR training, what is the reason? (You can choose more than one)		
You think it is very important for everyone who might face an emergency situation	319	85.7
Heart diseases within the family	50	13.4
Wish of avoiding unnecessary death	68	18.3
Other reason		
Would you be willing to take a free CPR course if it was offered?		
Yes	345	92.7
No	27	7.3
Do you think CPR training should be mandatory?		
Yes	278	74.7
No	94	25.3
Do you think that CPR training should be a requirement of educational subjects in the schools?		
Yes	344	92.5
No	28	7.5
Do you think that general places (schools, malls, parks) should have AED?		
Yes	270	72.6
No	102	27.4

CPR: Cardiopulmonary resuscitation

of cardiac events is becoming more common.[22,23] Maximize the number of trained individuals in the community can help to provide basic support at the time of need.

It was found from the analysis that over 75% of the general population living in Dammam did not receive CPR training ever. Hence, their knowledge about CPR and its technical aspects was very low, especially when they asked about the combination of chest compression and rescue breathing <25% responded correctly. Similarly, <10% had correct knowledge when they were asked how deep and fast should be chest compression. Furthermore, over 95% of the participants did not know that everyone can use AED. Disturbingly, 60% of the sampled population did not know the number to call in case of any medical emergency. This poor knowledge was because of either participant did have training at all or it was more than a year when they got training. Out of 91 who received training 60 (65.9%) said it was at least a year since they received the training. A study conducted in Qasim also had almost same findings, one-third of that study sample had CPR training and other reason of low knowledge was CPR training taken more than 2 years before the study.[10] Some other studies from Saudi Arabia also reported that knowledge among community members was low.[8,9]

Beside low knowledge, the attitude of the respondents was highly positive. They were keen to receive CPR training. A very high proportion of them was agreed to receive training if it is free. Furthermore, most of them showed positive attitude when they asked should it be mandatory for everyone and should it be included as educational requirement of the schools. Although people were willing to get CPR training, it is required to provide them opportunities. Such training programs should be easily accessible for everyone and the best way to this if it provides at their work place. Second, if it is added as part of educational curriculum then it would be great addition to achieve high number of trained individuals. Children are quick leaners and motivated easily[24,25] and can provide chest compression when 13–14 years old.[26]

Further studies in bigger scale are recommended to evaluate the CPR knowledge in the community. It is also required to study hurdles which prevent people to get trained even when they realized its importance. It is also important to study the strength and weaknesses of the program to make it more effective.

The small sample size was one of the study limitations. In addition, data were collected from one place only if multiple sites were used there could be more versatility in the sampled population. The inclusion of children could help to evaluate the opportunities of having BLS training at schools.

CONCLUSION

Attitude toward acquiring knowledge about CPR was very positive. However, their knowledge about the topic was insufficient. People should be aware of the importance of having this training and this can be done through media. Knowledge about the availability of programs at nearby places can also help to motivate people. It was found that most of the participants did not aware of places where they can attend the course. The busy daily schedule was another hurdle to go for the course hence arranging the course at workplace can help to overcome the problem.

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Original Article

To Compare the Efficacy of Tamsulosin and Deflazacort Combination with Tamsulosin Alone in Expulsion of Lower Ureteric Stones in a Medical College in South Haryana

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Abstract

Introduction: Men have been suffering from urinary stones since antiquity. Symptomatic ureteric stone is a very common emergency condition faced by general surgeons and urologists. There are many medical and interventional treatments for lower ureteric stones. Removal of stone with ureteroscopy is very effective but this is very costly also. Anesthetist is required; stent is placed in ureter which has to be removed afterward. Stones of size <4 mm will pass hopefully spontaneously. Stones more than 10 mm size will require surgery in general. The expulsion of stones of size 4–10 mm can be tried with the help of pharmacological agents.

Materials and Methods: This prospective observational study was conducted in the Surgery Department at SGT Medical College located in South Haryana. A total of 150 patients of distal ureteric stones of sizes 4–10 mm were taken in this study, divided into two groups of 75 patients each. Group I patients were given tamsulosin 0.4 mg and deflazacort 30 mg once in a day and Group II patients were given tamsulosin 0.4 mg once in a day. Treatment was for 10 days.

Results: In Group I, the stones were expelled in 24 (32%) patients. While in Group II, 11 (14.6%) patients passed stones. This is statistically significant with $P = 0.023$. The median time for stone expulsion was 192 h in Group I and 312 h in Group II with again a significant $P = 0.039$.

Conclusion: We conclude that Group I (tamsulosin + deflazacort) showed a statistically significant advantage in stone expulsion rate than Group II (tamsulosin alone). Group I also showed a statistically significant advantage in stone expulsion time.

Key words: Deflazacort, Diclofenac, Expulsion, Pain, Symptoms, Tamsulosin, Ureteric stones

INTRODUCTION

Men have been suffering from urinary stones since antiquity. English archaeologist E. Smith found a bladder stone in about 5000 years old mummy in Egypt.[1] Even Hippocrates knew the existence of renal stones. He has mentioned about renal stones in his Hippocratic Oath. *"I will not use the knife, not even on sufferers from stone, but will withdraw in favor of such men as are engaged in this work."*[2] Urolithiasis is a problem present in all geographical, racial, and cultural groups. Its risk is about 10–15% in developed world and 20–25% in developing countries.[3] The age group of 20–50 years is most commonly involved. Urolithiasis is more common in men than in women.[4] A ureteric stone is one that has moved down from kidney into the ureter. The stone starts as a tiny grain of solid matter and gets deposited in the kidney. With the passage of time, more and more grains are deposited and the stone increases in size. Most of the stones are eventually carried into the ureter. Among all ureteral stones, about 70% are found in lower one-third of ureter.[5] Symptomatic ureteric stone is a very common emergency condition faced by general

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surgeons and urologists. The pain is very severe. The pain is of colicky type and radiates from loin to groin, often to the tip of the genitalia, i.e. testis in males and labia majora in females. Nausea, vomiting, and sweating are usually due to pain and reflex pylorospasm. Hematuria, dysuria, frequency, and strangury may be present. There may be tenderness in iliac fossa and renal angle, but there is no rebound tenderness. It is difficult to differentiate this pain from the pain of appendicitis, cholecystitis, ovarian, or tubal pathology.[6] A large number of stones of size 2–4 mm will pass spontaneously in about 95% of cases.[7] There are many medical and interventional treatments for lower ureteric stones. Removal of stone with ureteroscopy is very effective but this is very costly also. Anesthetist is required; stent is placed in ureter which has to be removed afterward.[8-11] There are many pharmacological agents such as diclofenac, alkalizers, indomethacin, nifedipine, floroglucin, prazosin, deflazacort, silodosin, tamsulosin, and alfuzosin. We know that stones of size <4 mm will pass spontaneously in most of the cases.[7] Stones more than 10 mm size will require surgery in general. The expulsion of stones of size 4–10 mm can be tried with the help of pharmacological agents.[12] Further, surgery is also modality of choice if the intravenous urography shows deterioration of kidney functions, if there is coexisting infection and if the stone is impacted in ureter with persistent symptoms.[6] The genitourinary system is controlled by the autonomic nervous system (both sympathetic and parasympathetic). Hence, the autonomic nervous system is also responsible for modulating ureteric activity. Within the sympathetic system, alpha-adrenergic fibers are excitatory while beta-adrenergic fibers are inhibitory. Alpha-adrenergic fibers act on alpha-adrenergic receptors which are of three types, (1) alpha-1A, (2) alpha-1B, and (3) alpha-1D adrenergic receptors. Alpha-1A receptors are found in the proximal urethra, prostate, and distal one-third of ureter. Alpha-1B receptors are found more densely in the vascular smooth muscles while alpha-1D receptors are predominantly found in the detrusor and distal one-third of ureter.[13,14] A further study also revealed that alpha-1A and alpha-1D receptors are present more densely in the distal one-third of ureter than other adrenergic receptors.[15] Alpha-adrenergic stimulation induces a positive chronotropic effect, increasing ureteral peristaltic frequency and a positive inotropic effect, increasing muscle tone thus ultimately resulting in ureteral contraction, and decreased volume of urine flow passing through the ureter.[16] Alpha-blockers acting on these receptors relax the ureter and facilitate stone passage.[17]

Most recent alpha-receptor blocker to be used in this regard is tamsulosin which selectively acts on alpha-1A and alpha-1D receptors and these receptors are more abundantly present in lower part of ureter, so tamsulosin is more effective in expulsion of lower ureteric stones. The effect of tamsulosin on the obstructed ureter is to induce and increase in the intraureteral pressure gradient around the stone, that is, an increase in the urine bolus above the stone (and consequently, an increase in intraureteral pressure above the stone) as well as decreased peristalsis below the ureter (and consequently, a decrease in intraureteral pressure below the stone) in association with the decrease in basal and micturition pressures even at the bladder neck. By this mechanism of action, tamsulosin facilitates spontaneous passage of ureteral stone and reduces associated renal colic. Tamsulosin also decreases the frequency of phasic peristaltic contractions in the obstructed ureteral tract, but basal tone is marginally affected.[18] Tamsulosin being highly uroselective has very little activity over alpha-1B adrenergic receptors (the predominant subtype in the vasculature) as compared with other alpha-blockers, so it shows no dilatation of blood vessels, no change in blood pressure and pulse rate, no first-dose hypotension, and no increase in cardiovascular events. The only side effects of tamsulosin are dizziness and retrograde ejaculation.[19]

Stones cause inflammatory reaction and edema of ureteric mucosa.[20] Steroids by their anti-inflammatory action and capacity to decrease edema help to prevent these reactions. Deflazacort is a corticosteroid derived from prednisolone. It has mainly glucocorticoid activity. It is associated with side effects such as gastrointestinal tract disturbances, fluid and electrolyte disturbances, impaired healing, and increased susceptibility to infections, skin stria, and acne on long-term use. When used in combination with alpha antagonists[21,22] or calcium channel blockers,[23] it seems to increase the efficacy of these agents.

A few studies have been conducted in Western countries to find out the efficacy of tamsulosin in combination with deflazacort in expulsion of lower ureteral calculi. However, the results of different authors are at variance. Moreover, the disease spectrum in our country is different from that in developed countries mainly due to delay in diagnosis, delay in investigations, and lack of awareness. Therefore, it has been planned to study the role of tamsulosin and deflazacort combination and tamsulosin alone in expulsion of ureteric stone in Indian population.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Surgery at SGT Medical College (which happens to be in South Haryana), SGT University, Budhera, Gurugram, Haryana, India, from January 2018 to September 2019. A total of 150 patients coming to urology

or surgery outpatient department or emergency department with complaints of colicky abdominal pain and diagnosed, distal ureteric stones with the help of plain X-ray abdomen kidney, ureter, and bladder (KUB) or ultrasonography of KUB and of sizes 4–10 mm were considered for this study. Patients with stones, of more than 10 mm size, bilateral stones, impaired renal functions, coexisting infections, urethral stricture, history of ureteric surgery in past, severe hydronephrosis, liver disease, patients on beta-blockers, and patients with pregnancy were excluded from this study. An informed consent about the nature of research study was taken.

Study Design

This was a prospective observational study.

Ethical Considerations

The study was started after taking approval from the Institutional Ethics Committee for Research on Human Subjects. Throughout the study, ethical considerations were followed strictly. Confidentiality was ensured. The data were collected, and entries were made, and analysis was carried out using statistical SPSS version 23 software. Analysis was studied using Chi-square test.

All patients presenting with ureteric colic were given injection hyoscine butyl bromide intravenously and injection diclofenac intramuscularly. In all the cases, clinical history and examination were followed by relevant investigations such as urine complete examination, blood urea, skiagram, and ultrasonography of KUB region. Diagnosis of ureteric stone was made based on typical history of pain and its radiation, urinary symptoms, urine examination, skiagram, and ultrasonography.

These patients were allocated randomly to two groups of 75 each. Alternate patient was allocated to Group I and Group H. Group I (study group) patients were given a combination of tamsulosin 0.4 mg and deflazacort 30 mg and Group II (control group) patients were given tamsulosin 0.4 mg. Duration of treatment was 10 days or for lesser number of days if the stone passed earlier. Patients were prescribed diclofenac (50 mg) tablet as and when required. They were treated in the outpatient department. Patients were instructed to note the day, they pass the stone.

These patients were reassessed on the 3rd, 5th, 10th, and 15th days or telephonically. All patients were asked to pass urine through a sieve to note the passage of the stone. A skiagram and ultrasonography of KUB region was repeated to confirm whether stone had passed or not. The success rate of these two groups was assessed. Statistical analysis was done for expulsion of stone, days taken for expelling the stone, number of pain episodes, and amount of analgesics required during the treatment period.

RESULTS

The present prospective randomized study comprised 150 patients who attended the outpatient Department of Surgery and Urology and Emergency Department of SGT Medical College, SGT University, Budhera, Gurugram, Haryana. The study was conducted over a period of 1 year and 9 months from January 2018 to September 2019. In all the cases, clinical history and examination followed by relevant laboratory investigations such as hemoglobin, total leukocyte count, differential leukocyte count, blood urea, serum creatinine, urine complete examination, USG KUB, and plain X-ray KUB. One hundred and fifty diagnosed cases of lower ureteric stones were enrolled and allocated randomly. Each alternate patient was assigned to Groups I and II. Group I comprised 75 patients who were given tamsulosin 0.4 mg and deflazacort 30 mg once in a day for 10 days. Group II comprised another 75 patients who were given tamsulosin 0.4 mg once in a day for 10 days. All the patients had this treatment at their home. The mean age of the patients in Group I was 31.8 years and Group II was 34.1 years with $P = 0.502$ [Table 1]. Sex distributions revealed that in Group I, there were 76% of male and 24% of female patients. In Group II, there were 81.3% of male and 18.7% of female patients, $P = 0.569$ [Table 2]. Stones were located on the right side in 61.3% and left side in 38.7% in Group I patients. In Group II patients, stones were located on the right side in 57.3% and on the left side in 42.7% with $P = 0.576$ [Table 3]. Median stone size was 5.4 mm in Group I and 6.3 mm in Group II patients with $P = 0.612$ [Table 4]. Pain was present in all the patients. In both the groups, in 78.7% of patients, the pain radiated

Table 1: Mean age in years

Characteristic	Group I	Group II	*P* value
Mean age	31.8	34.1	0.502

Table 2: Sex distributions

Characteristic	Group I (%)	Group II (%)	*P* value
Sex			
Male	57 (76.0)	61 (81.3)	0.569
Female	18 (24.0)	14 (18.7)	

Table 3: Stone location

Characteristic	Group I	Group II	*P* value
Stone location			
Right	46 (61.3)	43 (57.3)	0.576
Left	29 (38.7)	32 (42.7)	

from loin to groin and often to the tip of the genitalia. Burning micturition was present in 20.0% of patients. Nausea, vomiting, and sweating due to pain and reflex spasm occurred in 52.7% of patients. Urinary urgency occurred in 16.0% of patients. Hematuria, dysuria, and strangury occurred in 11.3% of patients. Tenderness in iliac fossa and renal angle without any rebound tenderness occurred in 10.0% of patients [Table 5]. Hydroureter was found in 25.3% in Group I and 22.7% in Group II patients. There was no hydronephrosis in any patients [Table 6]. This study revealed that in 48.0% of patients in Group I and 45.3% in Group II, additional 225 mg diclofenac was used. In 28.0% of patients in Group I and in 30.7% of patients in Group II, more than 225 mg diclofenac was used. In rest of the patients, the amount was 150 mg or no additional diclofenac [Table 7]. The stone expulsion occurred in 24 (32.0%) patients in Group I and 11 (14.6%) patients in Group II with a significant $P = 0.023$ [Table 8]. The stone was expulsed in median 192 h in Group I and 312 h in Group II with a significant $P = 0.039$ [Table 9]. The side effects we observed were nausea and vomiting in 8 (10.7%) patients in Group I and in 11 (14.7) patients in Group II. Headache was in 5 (6.7%) patients in Group I and in 7 (9.3%) patients in Group II. Dizziness was found in 3 (4.0%) patients in Group I and in 4 (5.3%) patients in Group II. Constipation was found in 11 (14.7%) patients in Group I and in 2 (2.7%) patients in Group II. Retrograde ejaculation was found in 4 (5.3%) patients in Group I and in 5 (6.7%) patients in Group II. Nasal congestion was found in 4 (5.3%) patients in Group I and in 2 (2.7%) patients in Group II; diarrhea was found in 3 (4.0%) patients in Group I and in 2 (2.7%) patients in Group II [Table 10]. The side effects were insignificant and the therapy was continued.

Table 4: Median size of stone in mm

Characteristic	Group I	Group II	*P* value
Median size of stone	5.4	6.3	0.612

Table 5: Symptoms

Symptoms	Group I	Group II	Total (%)
Pain	75	75	150 (100)
Radiation of pain	62	56	118 (78.7)
Burning of micturition	18	12	30 (20.0)
Nausea, vomiting, and sweating	38	41	79 (52.7)
Urgency	11	13	24 (16.0)
Hematuria, dysuria, and strangury	8	9	17 (11.3)
Tenderness in iliac fossa and renal angle	7	8	15 (10.0)

Table 6: Incidence of back pressure changes

Groups	Hydroureter (%)	Hydronephrosis
Group I	19 (25.3)	Nil
Group II	17 (22.7)	Nil

Table 7: Amount of additional diclofenac used

Amount of additional diclofenac used (in mg)	Group I	Group II
0	4 (5.3)	2 (2.7)
150	14 (18.7)	16 (21.3)
225	36 (48)	34 (45.3)
>225	21 (28)	23 (30.67)

DISCUSSION

There are different approaches for the treatment of lower ureteric stones. First and foremost is spontaneous expulsion. The second approach is by the use of different pharmacological agents. Still, other approaches are endoscopic removal of stone. Various factors for spontaneous expulsion of ureteric stone are the size of stone, site of stone, and history of spontaneous stone

Table 8: Stone expulsion rate

Characteristic	Group I	Group II	*P* value
Expulsion rate	24 (32.0)	11 (14.6)	0.023

Table 9: Median time of stone expulsion

Characteristic	Group I	Group II	*P* value
Median time of stone expulsion in hours	192	312	0.039

Table 10: Side effects of therapy

Side effects	Group I (%)	Group II (%)
Nausea and vomiting	8 (10.7)	11 (14.7)
Headache	5 (6.7)	7 (9.3)
Dizziness	3 (4.0)	4 (5.3)
Constipation	11 (14.7)	2 (2.7)
Retrograde ejaculation	4 (5.3)	5 (6.7)
Nasal congestion	4 (5.3)	2 (2.7)
Diarrhea	3 (4.0)	2 (2.7)

Table 11: Expulsive rates using tamsulosin+deflazacort

Study	Duration of therapy (in days)	Mean stone size (in mm)	Expulsion rate in parentage
Dellabella *et al.*, 2004	28	6.9	96.7
Porpiglia *et al.*, 2002–2003	28	5.42	85
Porpiglia *et al.*, 2004–2005	10	5.88	84.8
Erkan *et al.*	28	4.10	75.5

expulsion. These factors cannot be modified. The factors which can be modified are the spasm of ureter, its edema, infection, and mechanism responsible for stone retention. The purposes of various pharmacological agents are to control pain, to check modifiable factors and expulsion of stone.

This prospective observational study was conducted in the Department of General Surgery at SGT Medical College, SGT University, Budhera, Gurugram, Haryana, India, from January 2018 to September 2019. A total of 150 patients coming to urology or surgery outpatient department or emergency department were considered. These patients complained of colicky abdominal pain and were diagnosed, distal ureteric stones with the help of plain X-ray abdomen KUB or ultrasonography of KUB. Stones of sizes 4–10 mm were considered for this study. Patients with stones, of more than 10 mm size, bilateral stones, impaired renal functions, coexisting infections, urethral stricture, history of ureteric surgery in the past, severe hydronephrosis, liver disease, patients on beta-blockers, and patients with pregnancy were excluded from this study. An informed consent about the nature of research study was taken.

So far as, age, sex, and site and size of stones are concerned, no statistically significant difference was observed between the two groups. The studies conducted by Dellabella *et al*., in 2002–2003,[24] and Porpiglia *et al*., 2002–2003,[25] report the predominance of lower ureteric stones in male, which is consistent with the study. Dellabella *et al*.[22] observed mean stone size as 6.9 mm and 6.4 mm in Group I and Group II, respectively. In a study by Porpiglia *et al*.,[21] the stone size was 5.88 mm and 5.96 mm in Group I and Group II, respectively. Porpiglia *et al*.[21] noticed that the right-sided ureteric stones were more than left sided. In this study, hydroureter was noted in 25.3% in Group I and 22.7% in Group II. Hydronephrosis was not seen in any patient because patients with hydronephrosis were not considered in this study. In most of the patients, additional diclofenac was used, for example, in Group I, 150 mg additional diclofenac was used in 18.7%, 225 in 48%, and more than 225 mg diclofenac was used in 28%. In only 5.3% of patients, no additional diclofenac was used. Respective figures for Group II are 21.3%, 45.3%, 30.7%, and 2.7%.

The most recent alpha-blocker being used for expulsion of ureteric stone is tamsulosin which selectively acts on alpha-1A and alpha-1D receptors, and these receptors are more abundantly present in lower part of ureter. Tamsulosin decreases the frequency of phasic peristaltic contraction in the obstructed ureteral tract, but basal tone is marginally affected. Several trials have shown the beneficial effects for expulsion of lower ureteral stones with tamsulosin alone or in combination with deflazacort. With tamsulosin alone in Group II, our expulsion rate is 14.6% and median time of stone expulsion is 312 h. In a study by Cervenàkov *et al*.,[26] the stone expulsion rate was 80%, in Autorino *et al*.,[27] 88%, Kaneko *et al*.,[28] 77%, and Griwan *et al*.[29] observed 90% expulsion rate. The cause for higher rate of stone expulsion in above studies and lower rate of stone expulsion in our study is not known. In our study in Group I (tamsulosin with deflazacort), the expulsion rate is 32%. Stone expulsion rate with a combination of tamsulosin and deflazacort in various studies shown in Table 11 varies from 75.5% to 96.7%. Again, we have no explanation, why our rates are low and the above study rates are very high. Mean time of stone expulsion in Group I was 192 h and in Group II 312 h. In a study by Dellabella *et al*., 2004, the mean time of stone expulsion was 72 h in Group I and 168 h in Group II. Only a few patients suffered from the side effects such as nausea, vomiting, headache, dizziness, constipation, retrograde ejaculation, nasal congestion, and diarrhea. The side effects were mild and the therapy was continued.

CONCLUSION

Age: No statistically significant difference was observed in mean age between the two groups. Sex: No significant difference was observed in sex distribution. Lower ureteric stones were more common in males than females. Lower ureteric stones were more common on the right side than the left side. Stone size: No significant difference was observed in stone size. Additional dose of diclofenac required was almost same in both the groups. Group I showed a statistically significant advantage in stone expulsion rate. Group I showed a statistically significant advantage in stone expulsion time.

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Original Article

Clinical and Angiographic Profile of ST-elevation Myocardial Infarction in Premenopausal Women

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Abstract

Introduction: Ischemic heart disease and its complications are on a rise in premenopausal women unlike previously thought that estrogen provides protective effects from cardiovascular diseases. There are less number of studies for premenopausal women with ST-elevation myocardial infarction and very few took into account the clinical and angiographic pattern.

Purpose: In this study, we took into account clinical and angiographic pattern as well as certain risk factor profile.

Materials and Methods: Women <50 years admitted in the Intensive Coronary Care Unit of Government Rajaji Hospital, Madurai, with ST-elevation myocardial infarction were taken into the study (43 in number). Their clinical presentation, risk factor profile, biochemical data, electrocardiogram and echo findings, and the angiographic findings were collected. The study was conducted over a period of 1 year.

Results: In our study, most of them were diabetics, non-vegetarians were using sunflower oil or palm oil, and almost 100% had dyslipidemia. Most of them had anterior wall myocardial infarction with ejection fraction >40%. Most of them had single-vessel disease. Thirty days mortality was very less. In about five patients, none of the conventional risk factors for coronary artery disease (CAD) were present.

Conclusion: Premenopausal women with ST-elevation myocardial infarction are on a rise in the current era, unlike previously thought. The previous studies were of comparative studies between premenopausal and postmenopausal women. Studies about the risk factors among this age group were very less. Although conventional risk factors such as diabetes and dyslipidemia played major role, some of the unusual risk factors and unidentified risk factors were found to contribute to the disease. Further studies are needed to identify the unusual risk factors for CAD present in this age group.

Key words: Angiographic pattern, Coronary artery disease, Premenopausal, Risk factors, ST-elevation myocardial infarction

INTRODUCTION

Ischemic heart disease and its complications are on the rise in premenopausal women unlike previously thought that estrogen provides protective effects from cardiovascular diseases.[1,2] Equal number of men and women of <50 years are affected by coronary artery disease (CAD), especially acute coronary syndromes.[3] There are less number of studies for premenopausal women with ST-elevation myocardial infarction (STEMI) and very few took into account the clinical and angiographic pattern. In this study, we took into account clinical and angiographic patterns as well as certain risk factor profiles.

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MATERIALS AND METHODS

Women <50 years in the premenopausal period, admitted in the ICCU of Government Rajaji Hospital, Madurai, with STEMI,[4] were taken into the study (43 in number). Their clinical presentation,[5] risk factor profile, biochemical data, electrocardiogram and echo findings, and the angiographic

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Table 1: Distribution of the parameters among the study population

Parameter	Number	Percentage
Age 40–50 years	34	79
Diabetes	25	58
Overweight and obese	12	28
Sedentary lifestyle	31	73
Sunflower oil usage	22	51
Palm oil usage	18	42
Non-vegetarians	34	79
Anterior wall myocardial infarction	33	77
Low-density lipoprotein >130	14	32
High-density lipoprotein <40	43	100
Ejection fraction >40%	34	78
Hypertension at presentation	20	47
Single-vessel disease	33	77
Double-vessel disease	5	12
Triple-vessel disease	5	12
In-hospital mortality	4	9

findings were collected. The in-hospital mortality was observed. The study was conducted for 1 year.

RESULTS

The data obtained are given in the following Table 1.

DISCUSSION

Previously, it was thought that premenopausal women are protected from CAD as there is a protective effect of estrogen on atherogenesis.[1,2] However, currently, there is a rising trend in the incidence of CAD among premenopausal women, especially acute coronary syndromes.

Diabetes was the leading risk factor for CAD in women.[6,7] Our study establishes the same. About 58% of our study population were diabetics. However, only 12% were in the overweight or obese range of body mass index. Hence, body weight did not have a direct association with CAD in our study.

A sedentary lifestyle obviously predisposed to CAD, as in our study.[8,9] The majority of them were non-vegetarians. We were trying to associate any particular oil usage among the study population. However, sunflower oil usage and palm oil usage were equally associated with them.

Although only 32% had abnormal low-density lipoprotein levels, almost 100% of the study population had abnormal high-density lipoprotein levels, directly related to atherogenesis.[10]

Anterior wall MI was the most common as in any study population, and ejection fraction was mostly >40%. All patients had significant CAD mostly in the form of the single-vessel disease, unlike previous studies showing normal coronaries or non-obstructive CAD.[11,12]

About 9% of the study population had in-hospital mortality, very less when compared to the in-hospital mortality among the general women population.[13]

CONCLUSION

Although most of the results were corroboratory to the previous studies,[6,14] some of the findings such as lesser overweight people, 100% dyslipidemia, 100% obstructive CAD, and very less in-hospital mortality[13] were new findings in our study.[15] This implies that there is a changing trend in the incidence of acute coronary syndromes in this population as well as some of the clinical and angiographic profile which was different in our study population. Further studies are needed to establish the causal role of any newer risk factors among this age group.

Limitations of the Study

This is an observational study and does not have control or comparative group. Hence, we could not compare the clinical and angiographic profile with postmenopausal women and also the causal role of the risk factors which were not able to be established in this study.

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Beliefs and Practices of Tribal Pregnant Women toward Foods in Alipurduar District of Eastern India

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Abstract

Objectives: A cross-sectional descriptive and community-based research was done in Alipurduar district of West Bengal to assess the existing beliefs and practices toward the foods during pregnancy. **Methodology:** A total of 170 respondents were selected randomly from Alipurduar district. The data were collected by the researcher with the help of pre-structure interview schedule. The collected data were arranged, analyzed, and interpreted to draw the conclusion. **Results and Discussion:** The study inferred that majority of the respondents (55.30%) from Alipurduar beliefs fully on eating papaya may cause a miscarriage, so it should be avoided and 58.82% of respondents were fully beliefs on taking milk with saffron, as saffron makes the baby fair skinned, whereas pomegranate and red apple may cause a baby of very bright and good complexion. **Conclusion:** Majority of the respondents (73.53%) have beliefs on prayer for preventing complications and for safe delivery. Mass awareness and preventive program about common prevalent diseases should be planned and launched in a location-specific manner in tribal areas. Proper coordination among the health workers and information, education, and communication activists of various institutional departments and disciplines are to be needed to create more effective awareness level among the tribal community for a real participatory development as mentioned in the Constitution of India.

Key words: Beliefs, Foods, Practices, Taboos, Tribal community, Tribal pregnant women

INTRODUCTION

Beliefs and taboos prevalence during pregnancy among the respondents – the restrictions imposed on people forces them to abstain from certain food and drinking items as these things are embedded into the cultural and religious threads. These taboos are a set of rules and regulations which allow us to eat or avoid certain kind of eatable or drinking items (Mintz and Du Bois, 2002). It is also seen that, due to some other kinds of health problems, people tend to follow certain rules, which are more such as restrictions on food intake and its types (Buruiana, 2003). Indian food taboos are mostly religion and to some extent certain community based. The traditional knowledge and wisdom, as it prevails in Alipurduar region of northern part of West Bengal, the unique social ecology they are thriving with and with the relative socioeconomic capacities they are accessing to social and institutional functions are to be cited as a precedential one in comparison to other homogeneous parts of India passing through faster urbanization process on the remnants of land-based agrarian ethnic-ecology in the name of 'development' followed by huge deforestation. Since the geospatial distribution on nutrition ecology economy has characterized the general health status of pregnant women, the present study envisages to extract critical factors operationally elucidate this disparaging levels, as is an axiom in this study, in the status of nutrition of pregnant women being spatially distributed two different social ecologies of Eastern India. The tribal people have a strong belief that the supernatural being may bring any diseases to them if it agrees with their day-to-day activities. Wrath of the local deities and intrusion of evil spirit is considered as important reasons for various illnesses. As per their perception, some religious beliefs

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such as mythological, supernatural, or spiritual aspects of a religion are the causes of illness. Indigenous people perhaps everywhere consider ritual remedies for diseases caused by supernatural agents, and counter magic for those caused by witchcraft and sorcery practices (Bailey, 2001).

METHODOLOGY

A community-based, cross-sectional descriptive study was conducted in Alipurduar district of West Bengal which was selected purposively to assess the existing beliefs and practices toward the foods during pregnancy. A total of 170 respondents from Alipurduar district were selected randomly. The data were collected by the researcher herself with the help of pre-structured interview schedule. The collected data were arranged, analyzed, and interpreted to draw the logical conclusion.

RESULTS AND DISCUSSION

Distribution and pattern of sociocultural beliefs with practices during pregnancy among the respondents are shown in Table 1, total seven points were included by the researcher as "eating papaya may cause a miscarriage; so it should be avoided," "eating pineapples may cause more than two eyes of the baby," "taking milk with saffron (Saffron makes the baby fair skinned), pomegranate, and red apple may cause a baby of very bright and good complexion," "prayer for preventing complications and for safe delivery," "eating ghee is important because it will make the delivery easy," "food and water restriction in public to prevent the evil looks," and "jackfruits and sesame seed (*til* seeds) can cause an abortion." The points in regard to "practices" against each "belief" points were followed one after another.

Table 1: Distribution of the respondents by the pattern of sociocultural beliefs and practices during pregnancy

Pattern and type of beliefs and practices		Up to what extent	Frequency	Percentage
Beliefs	Eating papaya may cause a miscarriage, so it should be avoided	Fully	94	55.30
		Partially	55	32.35
		Not at all	21	12.35
Practices	Papaya is avoided	Fully	72	42.35
		Partially	47	27.65
		Not at all	51	30.00
Beliefs	Eating pineapples may cause more than two eyes of the baby	Fully	26	15.29
		Partially	61	35.88
		Not at all	83	48.82
Practices	Pineapples are prohibited during pregnancy	Fully	21	12.35
		Partially	58	34.12
		Not at all	91	53.53
Beliefs	Taking milk with saffron (saffron makes the baby fair skinned), pomegranate, and red apple may cause a baby of very bright and good complexion	Fully	103	60.59
		Partially	48	28.23
		Not at all	19	11.18
Practices	Milk with saffron, pomegranate, and red apple are consumed	Fully	07	04.12
		Partially	94	55.29
		Not at all	69	40.59
Beliefs	Prayer for preventing complications and for safe delivery	Fully	125	73.53
		Partially	25	14.70
		Not at all	20	11.77
Practices	Prayer for the same	Fully	52	30.59
		Partially	77	45.29
		Not at all	41	24.12
Beliefs	Eating ghee is important because it will make the delivery easy	Fully	19	11.18
		Partially	54	31.76
		Not at all	97	57.06
Practices	Ghee is consumed during pregnancy	Fully	15	08.82
		Partially	54	31.76
		Not at all	101	59.41
Beliefs	Jackfruits and sesame seed (*til* seeds) can cause an abortion	Fully	12	7.06
		Partially	65	38.23
		Not at all	93	54.71
Practices	Jackfruits and sesame seed (*til* seeds) are avoided	Fully	07	04.12
		Partially	34	20
		Not at all	129	75.88

Table 2: Correlation matrix of Alipurduar district (education and various beliefs)

Variables		Correlation
Education	Papaya is avoided	r=−0.798
Education	Jack fruits are avoided during pregnancy	r=0.860
Education	Cold foods are avoided	r=−0.814
Education	Tea is avoided	r=0.987
Education	Milk with saffron, pomegranate, and red apple are consumed	r=−0.963
Education	Prayed to prevent any complications	r=−0.117
Education	Some religious artifacts	r=0.882

Table 2 shows the correlation coefficient between education level and various beliefs in Alipurduar districts. The correlation between education level and variables such as "papaya is avoided" (−0.798), "cold foods are avoided" (−0.814), and "milk with saffron, pomegranate, and red apple are consumed" (−0.963) is negatively correlated and the correlation was observed highly negative. Whereas the correlation coefficient between education level and variables such as "prayed to prevent any complications" (−0.117) is also negatively correlated, but the correlation was found to be a low one.

The correlation between education level and various beliefs such as "jack fruits are avoided during pregnancy" (0.860), "tea is avoided" (0.987), and "some religious artifacts" (0.882) was observed to be high positive correlation.

CONCLUSION

It is concluded that majority of the respondent beliefs on taking milk with saffron, pomegranate, and red apple may cause a baby of very bright and good complexion. Another important food taboos such as "eating papaya" may cause the miscarriage and believing on that taking papaya was avoided by more than half of the respondents. The correlation between education level and various beliefs such as "jack fruits are avoided during pregnancy," "tea is avoided during pregnancy," and also some religious artifacts was observed to be high positive correlation. A tremendous lack of interdepartmental coordination was found in the community development process, particularly in health and family welfare, nutrition supplementation, as well as mother and child care are to be addressed to create more effective awareness level among the tribal community for a real participatory development of Indian Tribes as mentioned in the Constitution of India. Mass awareness and preventive program should be planned and launched in a location-specific manner in tribal areas.

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Original Article

A Comparative Study of Chest X-ray and Chest High-resolution Computed Tomography in Blunt Trauma Chest Patients

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Abstract

Introduction: Computed tomography (CT) scan is an accurate tool for the detection of injuries in a trauma setting and is able to find the injuries that were occult in chest X-ray (CXR). In past years, the utility of CT scan was limited to severe trauma injuries but now is used in less severely injured trauma patients. The study aimed to compare the efficacy of CXR and chest CT scans in patients with chest trauma.

Materials and Methods: The present study was conducted in the Department of Surgery of Medical Institute. For the study, we prospectively view the previous medical records of the patients who were admitted in our surgical ward for blunt chest trauma and received both CXR and high resolution CT chest scans. A total of 95 patients were included in the study. Data regarding the study were collected.

Results: Out of 95 patients, 79 were males and 16 females. The mean age of the patients was 32.42 years ranging from 2 to 90 years. The most common cause for blunt trauma to the chest according to our results was a road traffic accident. We observed that CT scan is more accurate as compared to CXR in the detection of certain cases such as sternum fracture, rib fracture, scapula fracture, lung contusion, hemothorax, and pneumothorax.

Conclusion: Chest CT scan is highly sensitive in the detection of thoracic injuries following blunt chest trauma. In day-to-day practice, CT scan is better in visualizing as sternum fracture, rib fracture, scapula fracture, lung contusion, hemothorax, and pneumothorax.

Key words: Blunt trauma, Chest computed tomography scan, Chest X-ray, Rib fracture

INTRODUCTION

Blunt trauma is physical trauma by a non-penetrating impact through a blunt object or surface to a body part. Blunt trauma is the primary trauma, which develops more specific types such as contusions, abrasions, lacerations, and/or fractures. Traumatic injury is the leading cause of death under the age of 45 worldwide. Approximately 5.8 million people die each year as a result of injuries. This accounts for 10% of the world's deaths, more than the number of fatalities from malaria, tuberculosis, and HIV/AIDS combined. In India, every 1.9 min, trauma-related death occurs. Approximately 1 million people die and 20 million are hospitalized every year due to injuries.[1]

Chest trauma is one of the most serious injuries of the chest and also a common cause of significant disability and mortality. Chest trauma is the leading cause of death from physical trauma after head and spinal cord injury. Thoracic injuries are primary or a contributing cause of about one-fourth of all trauma-related deaths. The mortality rate in these cases is about 10%. Thoracic injuries account for approximately 20–25% of deaths due to trauma, 16,000 deaths occur per year in India alone as a result of chest

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trauma. Blunt trauma chest contributes to major accidental injuries in India, due to increased incidence of road traffic accidents (6% of global vehicular accidents) due to increased road traffic, availability of new high-speed vehicles and less awareness regarding traffic rules. A very few studies had been conducted to analyze its magnitude and management in Indian scenario.[2]

This study is carried out to determine the epidemiology and mechanism of chest trauma along with analyzing the management scheme and to note the prognosis and improvement of the management of chest injuries.

Chest radiograph is obtained for every blunt trauma chest patient after the stabilization of the patient. The diagnosis is generally obvious with standard chest radiography but more subtle sign requires careful analysis with computed tomography (CT) chest. High-resolution CT (HRCT) is the most important imaging method in this field. Its advantages occur especially because of high speed and high geometric resolution in any plane. Because of its advantages, HRCT has become the first-choice method in high-energy trauma. Diagnostic imaging with HRCT plays a key role in the management of high-energy chest trauma. HRCT is the most important imaging method in this kind of injury, as detailed information can be acquired in a short time.

MATERIALS AND METHODS

A study of cases of chest trauma admitted at Sanjay Gandhi Memorial Hospital, from June 1, 2018, to May 31, 2019, had been carried out. The study was pertaining to blunt chest trauma. Information was obtained directly from the patient whenever possible and from other witnesses of an accident if available.

No. of patients – 95.

Inclusion Criteria

All patients with blunt trauma chest in HRCT chest done were included in the study.

Exclusion Criteria

The following criteria were excluded from the study:

- Penetrating chest injury
- Patients who absconded or left against medical advice.

Methodology

The study was conducted over the patients admitted from casualty, Outpatient Department and those who transferred from other wards. After eliciting the proper history and mode of trauma, vitals were regarded, and initial airway, breathing, circulation, and deformities were assessed without any delay. After stabilizing the vitals, the patients who were diagnosed as blunt trauma chest were assessed properly and sent for lab investigations and X-ray was done. The patients were then shifted to ward and sent for HRCT chest. The reports of X-ray chest and CT chest were analyzed and recorded in pro forma. All these data were recorded meticulously in pro forma and master chart after that systematic tabulation, observation, and analysis done. Summary and conclusion were drawn after discussion with review of the literature.

RESULTS

In the present study, a total of 95 patients participated, out of 95 patients, 79 were males and 16 females. The mean age of the patients was 32.42 years ranging from 2 to 90 years.

The most common cause for blunt trauma to the chest according to our results was road traffic accidents with number of patients affected to be 65. Table 1 and Graph 1 shows the comparison of positive radiological findings in chest X-ray (CXR) and CT scan. We observed that CT scan is more accurate as compared to CXR in reporting the lesion. Statistically, significant difference was seen in cases of sternum fracture, rib fracture, scapula fracture, hemothorax, and pneumothorax.

DISCUSSION

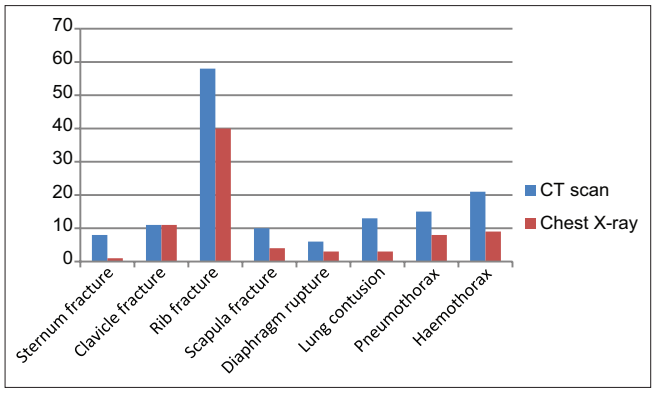
The present study entitled *"A comparative study of chest x-ray and chest high-resolution computed tomography in blunt trauma chest patients"* was carried out in patients of blunt trauma chest admitted to the Department of Surgery of S. S. Medical College and associated Sanjay Gandhi Memorial Hospital Rewa (Madhya Pradesh) during the period from June 1, 2018, to May 31, 2019.

Chest trauma is one of the most serious injuries of the chest and is a common cause of significant disability and mortality. It is the leading cause for death following physical trauma after head and spinal cord injury. Thoracic injuries are found to be the primary or contributing cause for about 25% of all trauma-related deaths.

Table 1: Comparison of positive radiological findings in chest CT and chest X-ray

Findings	CT scan	Chest X-ray	*P* value
Sternum fracture	8	1	<0.001
Clavicle fracture	11	11	0.2
Rib fracture	58	40	<0.001
Scapula fracture	10	4	0.02
Diaphragm rupture	6	3	0.3
Lung contusion	13	3	<0.01
Pneumothorax	15	8	<0.001
Hemothorax	21	9	0.59

CT: Computed tomography



Graph 1: Comparison of positive radiological findings in chest computed tomography and chest X-ray

The results showed that CT scan is more sensitive and accurate as compared to CXR for diagnosis of sternum fracture, rib fracture, scapula fracture, lung contusion, hemothorax, and pneumothorax. Similar studies conducted by other authors in the past have shown similar results.

CXR alone is not effective in the management of the patient and finally CT scan should be used. This finding is complementary to Wicky *et al.*,[3] study in which they concluded that CXR is the most efficient modality for all chest trauma patients because of its ability to detect most life-threatening lesions. However, Exadaktylos *et al.*[4] recommended CT scan as the primary diagnostic tool in patients with major chest trauma because they showed that over 50% of patients with abnormal CXR had multiple injuries on the CT scan. In our study, CXR identified hemothorax in 16.4% cases in study sample compare to CT chest which identified 29.5% cases in study sample, (P = 0.01846 [<0.05]), CXR identified pneumothorax in 9% cases in study sample compare to CT chest which identified 27.4% cases in study sample, (P = 0.00224 [<0.05]), and CXR identified hemopneumothorax in 7.5% cases in study sample compare to CT chest which identified 17.9% cases in study sample, (P = 0.036029 [<0.05]). In another study, Traub *et al.* in 2007[5] found CXR identified hemothorax in 7% cases, where CT chest found hemothorax in 11.3% cases. The same result also is seen in pneumothorax, where X-ray chest detects 6.4% cases of pneumothorax and CT chest found 22% cases of pneumothorax, and CXR identified hemopneumothorax in 0.7% cases, where CT chest found hemopneumothorax in 11.3% cases. Chardoli *et al.*[6] conducted a study to detect the accuracy of CXR versus chest CT in hemodynamically stable patients with blunt chest trauma. The study was conducted at the Emergency Department of Sinai Hospital from March 2011 to March 2012. Hemodynamically stable patients with at least 16 years of age who had blunt chest trauma were included in the study. All patients underwent the same diagnostic protocol which consisted of physical examination, CXR and CT scan, respectively. Two hundred patients (84% male and 16% female) were included with a mean age of 37.9 ± 13.7 years. Rib fracture was the most common finding of CXR (12.5%) and CT scan (25.5%). The sensitivity of CXR for hemothorax, thoracolumbar vertebra fractures, and rib fractures was 20%, 49%, and 49%, respectively. Pneumothorax, foreign body, emphysema, pulmonary contusion, liver hematoma, and sternum fracture were not diagnosed with CXR alone. The authors occluded that applying CT scan as the first-line diagnostic modality in hemodynamically stable patients with blunt chest trauma can detect pathologies that may change management and outcome. Trupka *et al.*[7] evaluated whether early thoracic CT (TCT) is superior to a routine CXR in the diagnostic workup of blunt thoracic trauma and whether the additional information influences subsequent therapeutic decisions on the early management of severely injured patients.

In a planned investigation of 103 back to back patients with clinical or radiologic indications of chest injury, starting CXR and TCT were looked at after introductory appraisal in our crisis branch of a Level I injury focus. In 67 patients (65%), TCT distinguished significant chest injury intricacies that have been missed on CXR (lung wound (n = 33), pneumothorax (n = 27), residual pneumothorax (n = 7), hemothorax (n = 21), chest tube displaced (n = 5), rupture in diaphragm (n = 2), and rupture in myocardium (n = 1)). In 11 patients, just minor extra pathologic (dystelectasis, and little pleural emission) was envisioned on TCT, and in 14 patients CXR and TCT demonstrated the same pathologic outcomes. Eleven patients experienced both CXR and TCT without pathologic discoveries. The TCT examine was fundamentally more compelling than routine CXR in distinguishing lung injuries, pneumothorax, and hemothorax. In 42 patients (41%), the extra TCT discoveries brought about a difference in treatment: Chest tube position, chest tube adjustment of pneumothoraces or huge hemothoraces, change in mode of ventilation and respiratory care, influence on the management of fracture stabilization, laparotomy in cases of diaphragmatic lacerations, bronchoscopy for atelectasis, exclusion of aortic rupture, endotracheal intubation, and pericardiocentesis. It was concluded that TCT is highly sensitive in detecting thoracic injuries after blunt chest trauma and is superior to routine CXR in visualizing lung contusions, pneumothorax, and hemothorax.

Ebrahimi *et al.*[8] evaluated the diagnostic accuracy of chest ultrasonography (CUS) and chest radiography (CXR) for the detection of pneumothorax. Only those articles were selected for the study in which patients were diagnosed with pneumothorax and were advised CT scans. The analysis showed that the pooled sensitivity and specificity of CUS were 0.87 and 0.99, respectively, and for CXR were 0.46

and 1.0, respectively. The meta-regression showed that the sensitivity and specificity of ultrasound performed by the emergency physician were higher than by non-emergency physicians. Non-trauma setting was associated with higher pooled sensitivity and lower specificity. It was concluded by the authors that the diagnostic accuracy of CUS was higher than supine CXR for the detection of pneumothorax. Yazkan *et al*.[9] compared CT and CXR in the diagnosis of rib fractures in patients with blunt chest trauma. A total of 83 patients with blunt chest trauma who were treated in three hospitals between May 2010 and June 2011 and who had received both chest CT scan and CXR as part of their initial assessment were included in the study. On the CT scan, the number of rib fractures was 3.75 ± 2.35 whereas on CXR, the number of rib fractures was 2.15 ± 2.12. On comparing the results, the authors observed a statistically significant difference between CT scan and CXR. It was concluded by the authors that to detect rib fracture accurately and more positively, chest CT scan should be employed as compared to CXR as CT scan is more sensitive and reliable.

CONCLUSION

From the results of the present study, we conclude that the chest CT scan is highly sensitive in the detection of thoracic injuries following blunt chest trauma. In day-to-day practice, CT scan is better in visualizing sternum fracture, rib fracture, scapula fracture, lung contusion, hemothorax, and pneumothorax.

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Original Article

Decadal Change in Mortality Pattern of Surgical Patients – A Study in Government Tertiary Care Hospital in Vindhya Region

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Abstract

Introduction: The aim of the study was to study the change in mortality pattern of surgical patients in government tertiary care hospital over a decade.

Background: By analyzing the mortality pattern, we can identify the major reason for death in surgical wards. That will help to install our preventive strategies and allocate appropriate resources in terms of manpower and equipment where they are most critically needed.

Materials and Methods: For our retrospective study, necessary data were obtained from the registration department due to permission from hospital authority. Out of all the admissions, data of the expired patients during the year 2008 and 2018 in detail using the proforma sheet have extracted. Then, a retrospective and descriptive observational study was done on all patients who have died in the surgery department during the year 2008 and 2018 of Sanjay Gandhi Memorial Hospital (S.G.M.H), associated with Shyam Shah Medical College, Rewa (Madhya Pradesh), during the year 2008 and 2018.

Results: In 2008, there were 6286 admissions, of which 453 deaths were occurred, in contrast to 2018 there were 10,887 admissions, of which 702 deaths were noted and observed mortality rate (7.20%) in 2008 and (6.44%) in 2018. During our study, we observed that burn (26.04%) was the leading cause of the death in 2008 and (26.64%) in 2018, next was the road traffic accidents (RTA) specific to head injury (13%) in 2008 and (23.38%) in 2018 and, at third position, viscus perforation (16.78%) was the cause of death in 2008 and (16.39%) in 2018. The case fatality rate is overall decreased over a decade in all diseases.

Conclusion: In our institute (S.G.M.H), surgical mortality has reduced from 7.20% (2008) to 6.44% (2018) almost by 1% over a decade. Burn and RTA were the leading causes of the deaths to reduce the incidence in this both groups, we need to work in both directions as one side we need to improve in our infrastructure and services, and on the other side, we need to focus in preventive strategy as these causes can be preventable by educating the preventive strategies to the people at ground level.

Key words: Cause of death, In-hospital surgical mortality, Retrospective study, Tertiary care

INTRODUCTION

All living organisms are born on the earth to have to die as a part of the life cycle. Death is not completely preventable but the doctors can control to some extent over unnecessary deaths and have a special responsibility to increase the life expectancy with good quality of life of the populations. In an ancient era due to lack of undeveloped medical science, there were thousands of deaths used to occur, nowadays in modern advanced medical era we are achieving a wonderful control over those preventable deaths. In high-income countries, the death rate is low due to easy accessibility, availability, and affordability of health care as compared to low-income countries.

Developing country like our India where most of the population live in the non-urban area, where the health-care

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facilities at rural primary level are constrained. Our institute (Sanjay Gandhi Memorial hospital [S.G.M.H]) which is situated in Vindhya region and is a government tertiary care hospital which is taking care of all patients seeking health care from nine districts such as Sidhi, Satna, Singroli, Chhatarpur, Damoh, Panna, Shahdol, Umaria, and Tikamgudh, our hospital has high numbers of OPD (Outdor patients) and admissions in Surgery Department. By analyzing the mortality pattern, we can identify the major reasons for death in surgical wards. That will help to plan strategies to prevent the events leading to the death of a patient. The audit of mortality also helps in allocating appropriate resources in terms of manpower and equipment where they are most critically needed. We can compare our mortality results with other centers and also with our own previous records to see if we have improved ourselves or not?

The basic aim of any surgical procedure is the reduction in morbidity and mortality rates. By comparing the influence on adverse outcomes; assessment of the efficiency of surgical procedure and the quality of care provided can be done. The results of the present study will help to improve the quality of care by educating the health-care professionals about preventable deaths and to suggest the infrastructure required. There are many reports of similar work in the west[1] and even from African nations[2,3] reports from India are few.[4,5]

MATERIALS AND METHODS

For our retrospective study, necessary data were obtained from the registration department due to permission from hospital authority. Out of all the admissions, data of the expired patients during the year 2008 and 2018 in detail using the proforma sheet have extracted. Extracted data included name, age, sex, and date of admission, date of expiry, hospital stay, comorbidity, investigation, mode of injury, cause of death, and surgical procedure performed. All records were submitted back to the registration after extracting proforma sheets. Then, a retrospective descriptive observational study was done on all patients who have died in the surgery department during the year 2008 and 2018 of S.G.M.H, associated with Shyam Shah Medical College, Rewa (Madhya Pradesh), during the year 2008 and 2018.

The hospital is a tertiary referral government teaching hospital. Retrospectively, all patients who have died in surgery wards during the year 2008 and 2018 were included in the study. Case definition of in-hospital surgical mortality which was included in the study was deaths occurring within 30 days of admission for surgical care which has been traditionally used in other studies.

OBSERVATION AND RESULTS

In the year of 2008, there were 6286 admissions to the surgical ward. Men were 3771 (59.72%) and women 2515 (40.00%), among them 453 deaths occurred. Of the 453 deaths, 256 (56.51%) were males and 197 (43.48%) were females in a ratio of 1.29:1. In the year of 2018, there were 10,887 admissions to the surgical ward. Men were 6286 (57.73%) and women 4686 (42.26%), among them 702 deaths occurred. Of the 702 deaths, 361 (51.42%) were males and 341 (48.57%) were females in a ratio of 1.05:1. In 2008, the mortality rate was 7.20% and, in 2018, the mortality rate is 6.44%; there is a decrement in the proportional mortality rate over a decade [Tables 1 and 2].

Table 3 shows the age distribution as well as the number of deaths in each gender. Age-wise proportional mortality was highest in the age group between 21 and 30 years, in 2008 which was 21.64%, and the same age group had the highest proportional mortality found in 2018 which is 22.08%.

Burn was the leading cause of death in 2008 (26.04%) and in 2018 (26.64%). Next was the road traffic accidents (RTA) specific to head injury in 2008 (13%) and in 2018 (23.38%)

Table 1: Incidence and mortality rate in the surgery ward in 2008 and 2018

Year	Total numbers of admissions	Total numbers of deaths	Mortality rate%
2008	6286	453	7.20%
2018	10887	702	6.44%

Table 2: Gender-specific mortality rate in 2008 and 2018

Sex	Admissions 2008	Deaths 2008	GSDR%	Admissions 2018	Deaths 2018	GSDR%
M	3771	256	6.79	6286	361	5.83
F	2515	197	7.83	4686	341	7.27

GSDR: Gender specific death rate

Table 3: Age-wise proportional mortality during 2008 and 2018

Age group years	Total number of death in 2008	Total number of deaths in 2018	In 2008, PMR%	In 2018, PMR%
0–10	45	12	9.79	1.71
11–20	67	86	14.79	12.25
21–30	98	155	21.64	22.08
31–40	61	113	13.34	16.10
41–50	54	110	11.92	15.67
51–60	44	77	9.71	10.96
61–70	45	90	9.93	12.82
71–80	24	44	5.29	6.26
81–90	1	18	0.22	2.56

PMR: Proportional mortality rate

and, at third position, viscus perforation was the cause of death in 2008 (16.78%) and 2018 (16.39%). Other diseases include deaths due to pancreatitis, obstructive uropathy, uremia, obstructive jaundice, and (hepatobiliary pathology), which is given in Table 4.

During our study, we noted that the case fatality rate of all diseases is reduced over a decade which reflects the improvement in providing good quality of care and facilities which are mentioned in Table 5.

Table 6 shows that most of the deaths in burn departments in 2008 and 2018 occurred in those patients whose body surface area involved more than 60% which is almost unpreventable deaths.

Table 4: Cause of death during 2008 and 2018

Diagnosis	Number of deaths 2008	Percentage	Number of deaths 2018	Percentage
Burn	118	26.04	187	26.64
RTA (head injury)	76	16	164	23.38
Viscus perforation	76	16.78	115	16.39
Soft-tissue infection and necrosis	52	11.49	87	12.40
Intestinal obstruction	43	9.49	65	9.3
Malignancy	21	4.63	25	3.58
Blunt trauma chest	9	1.98	25	3.57
Blunt trauma abdomen	13	2.87	12	1.71
GI bleeding	7	1.54	13	1.85
Others	38	8.39	9	1.28
Total	453	100	702	100

RTA: Road traffic accidents, GI: Gastrointestinal

DISCUSSION

Mortality rate is the proportion of a population who die from any cause during a specified period of time. The rate can be made specific for a particular cause or group of causes of death. The rate can also be calculated for each sex and for any age group, thus providing disease, sex, and age-specific rates.

The determination of the pattern of mortality in a surgical unit helps in planning and to provide quality surgical care,[6] as well as to ensure the improvement in management techniques which might help to unravel the mysteries of death of unknown origin.[6] It will also enable us to know the changing pattern of mortality in the surgical environment, and understanding of the severity of the diseases that present to surgical units.

Mortality

The present study shows that the mortality rate of admitted patients was 7.20% in 2008 and 6.44% in 2018 in surgical wards. This observation in present study compares reasonably with studies by various authors in developing countries, such as Krishnamurthy *et al.*,[6] Chukuezi and Nwosu,[2] Ihegihu *et al.*,[7] and Ayoade *et al.*,[1] 6.5%, 9.14%, 8.3%, and 5.09%, respectively. Our mortality rate is almost similar. It is just because of availability of same level of health-care facility and same circumstances. In contrast, in developed countries where McDonald *et al.*[8] and Semel *et al.*[9] reported surgical mortality as 2.3% and 1.32%, respectively. This significant difference in surgical mortality rates between resource-poor and developed countries may be due to their better health system at each level, but more

Table 5: Case fatality rate of various causes in the year 2008 and 2018

Diagnosis	Total admissions in 2008	Total deaths in 2008	Case fatality rate in 2008 (%)	Total admissions in 2018	Total deaths in 2018	Case fatality rate in 2018 (%)
Burn	315	118	37.46	546	187	34.24
RTA (head injury)	752	76	10.10	1675	164	9.77
Viscus perforation	210	76	31.19	396	115	28.78
Soft-tissue infection and necrosis	1452	52	3.67	2560	87	3.39
Intestinal obstruction	222	43	19.37	354	65	18.36
Blunt trauma chest	158	9	5.69	470	25	5.32
Blunt trauma abdomen	164	15	9.14	284	12	4.22

RTA: Road traffic accidents

Table 6: Deaths according to BSA% and CFR according to BSA% in the year 2008 and 2018

BSA%	Admission in 2008	Deaths in 2008	CFR according to BSA%	Admission in 2018	Deaths in 2018	CFR according to BSA%
1–20	71	1	1.40	118	2	1.69
21–40	86	8	9.30	164	13	7.92
41–60	38	12	31.57	81	23	28.39
61–80	46	34	73.91	71	49	69.10
81–100	74	63	85.13	112	100	89.28
TOTAL	315	118	37.46	546	187	34.24

BSA: Body surface area of burn, CFR: Case fatality rate

than that. Their general surgery unit does not include head injury, burn, and chest trauma patients because these patients are admitted in respective specialty unit with well-equipped infrastructures, like all the head injury patients are admitted in neurosurgical department, burn patients are admitted in burn and plastic department, in contrast, our institute, and many other places are deficient of such facilities where all RTA and burn patients are admitted in general surgical ward. In our study, the majority of deaths nearly 50% of are due to head injury and burn. If we exclude mortality due to burn and head injury, then almost we are able to achieve a mortality rate of 3% like other developed nations.

Crude death rate, in our study, has decreased from 72 to 64/1000 admitted patients; this shows that we have improved our health-care services but still, we need to improve it further to minimize the crude death rate more. In our analysis in 2008 and 2018, majority of deaths were noted in the 3rd, 4th, and 5th decades of life with the peak occurring at the 3rd decade. This observation is similar to Ayoade *et al.*[1] study. Death in this productive age group adds to the burden of the family and society. Deaths among women occur more frequently in the 2nd and 3rd decades with the peak in 3rd-decade similar to men. It is mainly due to the involvement of RTA and burn group. As in 3rd-decade, proportional mortality rate was highest, as 21.64% in 2008 and 22.08% in 2018.

In our analysis, we observed that burn (26.04%) was the leading cause of death in 2008 and 26.64% in 2018, next was the RTA specific to head injury (13%) in 2008 and (23.38%) in 2018 and, at the third position, viscus perforation (16.78%) was the cause of death in 2008 and (16.78%) in 2018. In contrast Krishnamurthy *et al.* (2016),[6] reported leading cause was RTA specific to head injury (27.86%) followed by burns (27.17%), this is not similar to our study.

Case Fatality Rate Due to Burn

In our study, almost half of the deaths (352 of 702=54%) were due to burn and RTA with a head injury. Burn was the predominant cause of death among women (154 [49.84%] of 309 female deaths in 2018). As the burn injuries are due to marital discord and domestic problems, they were more common among women at late 2nd, 3rd, and 4th decades, 70 presents of the burn victims are in most productive age group of 15–40 years and most of the patients belong to poor socioeconomic strata. In our study, there is no significant change in mortality due to burn over a decade. (In 2008, 26.04% deaths were due to burn and in 2018 it is 26.64%).

Case fatality rate due to burn has reduced to some extent (in 2008, it was 37.46% and, in 2018, it is 34.24%) this explaining the improvement in providing better quality care and facility over a decade. In 2008, there was not a separate burn unit but in 2018, we have separate burn unit trained staff and manpower too, where we are providing a better care to the patient. During our study, we analyzed that more than 70% of death has occurred in those patients whose percentage of burn (bank secrecy act) was >60%. It is very difficult to save such patients even at better facility available health-care centers.

Case Fatality Rate Due to Head Injury

From our analysis, we have observed a decrement change in case fatality rate due to head injury from 10.10% to 9.77% over a decade. Which suggest that in spite of high incidence of RTA, we have achieved less case fatality rate, this suggest our improvement in neurosurgical services and emergencies department. A decade ago we did not have better neurosurgical facilities; we were less equipped with necessary machineries. Most of the head injuries patients were forced to send nearby other higher center such as Jabalpur, Nagpur, and Allahabad for better care of the patients. But gradually this trend is near to end at present in our institute. Over the years, we have improved our neurosurgical services, and our emergencies department. High tech computed tomography and magnetic resonance imaging machines with availability of neurosurgeons have totally changed the scenario. Nowadays, all RTA patients are being managed well with provision of required emergency care without delaying time. However, it is not enough to reduce mortality of head injury; we need to focus on incidence reduction strategy and preventive measures. Incidence of RTA has also increased in females (23.78%) over a decade; it is mainly due to increase female's mobility over roads.

Case Fatality Rate Due to Viscus Perforation

In our study, we analyzed that there is a decrement in case fatality rate due to viscus perforation from 31.19% to 28.78% over a decade. Still, it is third major cause of death in our institute, because in case of acute abdomen the early diagnoses and early intervention is the most important in the management, but in our institute most of the patients used to reach late with complication such as septicemia and irreversible shock. In those patients, even of our best efforts it becomes very difficult to save their lives. We have improved our casualty facilities so that required intervention should be performed timely to limit the mortality. Nearly 40% of deaths were due to pre-pyloric perforation among operated cases in 2008, which is decreased to 34% in 2018.

Case Fatality Rate Due to Soft Tissue Infection

The present study shows that there is a decrement in CFR due to soft-tissue infection over a decade from 3.67%

to 3.39% this explains that although there is doubling in incidence of soft-tissue infection over a decade, we have reduced the mortality by preventing the existence of septicemia and sepsis to some extent. It is mainly because of early intervention and better supportive care.

CONCLUSION

In our institute, overall surgical mortality has reduced from 7.20% to 6.44% almost by 1% over a decade. Burn was the most common cause of death. Inspire of our improved services in burn case management and better facility, we could not decrease mortality of burn. It is just because of unpreventable deaths in burns. Females were mostly involved it is due to marital harassment, emotional fragility, and less psychosocial support. To reduce mortality as well as incidence, we need to focus on incidence reduction strategy like we should educate the people about safety awareness at primary level. At primary level existing staff (such as auxiliary nurse midwifes, nurses, and dressers) should be sensitized and trained on burn first aid. The main strategies for burn care would be to provide physical infrastructure and workforce for burn care at all three levels of health delivery system. Our institute is just going to open a separate wing for burn that may help in reduction of burn mortality in future.

Second cause of death was RTA specific to head injury. We have reduced mortality to some extent level by improving our neurosurgical services, for further reduction, we require full pledge trauma care unit and ATLS courses should be included in resident training. To reduce the incidence of trauma, we should educate the people at ground level regarding the road traffic safety and preventing measures for RTA. Strict implementation of traffic rules and stringent punishments alone will not solve the persisting crisis. Change in mind set of riders and drivers and road users realizing their responsibilities alone will bring about a change. Soon we are going to open super specialty block for neurosurgery that may reduce the mortality due to head injury in future.

In our study, the major obstacles were heavy burden of RTA patients and burn patients. To reduce the incidence in this both groups, we need to work in both directions as one side we need to improve in our infrastructure and services and the other side we need to focus in preventive strategy.

Limitation of the Present Study

Could be its a short scale study? It should be done in large scale at each hospital to improve the health-care system at all three primary, secondary, and tertiary levels.

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Original Article

Serum Albumin Levels in Patients with Dengue Fever – A Longitudinal Study

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Abstract

Background and Objectives: Dengue is an arboviral disease that is a major public health threat globally. In the past 50 years, the incidence of dengue has increased about 30-fold. Clinical manifestations may range from asymptomatic patients to dengue shock syndrome. It is very important to know early, which patient will go on to develop complications for planning management. Like any other disease, dengue also has various biomarkers which are used to find out dengue infection and severity of dengue infection. Serum albumin is a negative acute-phase reactant whose level decreases during many infections. Serum albumin was found to be an independent factor associated with severe dengue and dengue mortality in various studies. The aim of this study is to compare serum albumin levels among severe and non-severe cases of dengue and to find any association.

Materials and Methods: This study was done on 120 dengue patients admitted in Government Medical College Ernakulam from January 2017 to December 2017. The clinical features and investigations results were noted. Serum albumin was done on the day of admission and the 3rd day of admission. Patients were classified into mild, moderate, and severe based on the severity of dengue. Serum albumin levels were compared with the different severity groups.

Results and Discussion: Of the 120 patients studied, 84 were male and 36 were female. The mean serum albumin of dengue patients on the day of admission was 3.61 g/dl and on the 3rd day of admission was 3.48 g/dl. The mean albumin on the day of admission was 3.71 g/dl, 3.60 g/dl, and 3.34 g/dl for mild, moderate, and severe dengue, respectively (P = 0.005). The mean albumin on the 3rd day of admission was 3.62 g/dl, 3.47 g/dl, and 3.19 g/dl for mild, moderate, and severe dengue patients, respectively (P = 0.001). As the severity of dengue increases, the mean day 1 and day 3 albumin levels decrease, which is statistically significant. Hypoalbuminemia (<3.5 g/dl) was seen on day 1 in 34.8%, 34%, and 57.1% among mild, moderate, and severe dengue patients, respectively (P = 0.148). There was no significant association of hypoalbuminemia on day 1 with the severity of dengue. Hypoalbuminemia was seen on day 3 in 26.1%, 47.2%, and 81% of mild, moderate, and severe dengue patients. There is a significant association between hypoalbuminemia on day 3 and severity of dengue. On 3rd day of admission, hypoalbuminemia was seen more as the severity of dengue increased.

Conclusions: As the severity of dengue increased, there was a fall in serum albumin levels and it was statistically significant. Serum albumin can be used as a prognostic marker for dengue.

Key words: Dengue fever, Serum albumin, Severe dengue

INTRODUCTION

Dengue is an arboviral disease that is a major public health threat globally. At present, dengue fever (DF) causes more illness and death than any other arboviral disease of humans. Dengue belongs to the family Flaviviridae, genus *Flavivirus*, and species dengue virus (DENV). There are four serologically distinct types of DENV, DENV-1, DENV-2, DENV-3, and DENV-4. These viruses are transmitted to human beings by *Aedes* mosquitoes such as *Aedes aegypti* and *Aedes albopictus*. In the past 50 years, the incidence of dengue has increased about 30-fold.[1] In India, dengue was first reported in Madras (now Chennai) in 1780, and the first outbreak of dengue occurred in Calcutta (now Kolkata) in 1963. Thereafter, outbreaks occurred in different parts of India. Even though dengue was previously restricted to urban areas, now, it has spread

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to rural areas also.[2] In 2017, Kerala had the maximum number of dengue patients in India.[3]

Objectives

The objectives of this study were to estimate serum albumin levels in dengue patients admitted in wards of Government Medical College, Ernakulam, and to compare serum albumin levels among severe and non-severe cases of dengue.

MATERIALS AND METHODS

This was a longitudinal study conducted in patients admitted with dengue in the medical wards of Government Medical College, Ernakulam. The study was conducted for 1 year. All patients who fulfilled the inclusion criteria were recruited to the study with informed consent.

Once the patient got admitted history was taken and data collected in prestructured pro forma. Details of history, examinations, and laboratory and technical investigations reports were noted from time to time. Patients were treated specifically and symptomatically.

DF was confirmed by immunochromatographic method identifying the antibodies against DENV – immunoglobulin M (IgM) and dengue viral antigen – nonstructural protein 1 (NS1). Five milliliters of venous blood was taken to a plain bottle for estimation of serum albumin. Serum albumin was measured using ALB slide method using VITROS ALB slides. Serum albumin levels were measured on day 1 and day 3 of admission. Patients were followed up clinically during the hospital stay until discharge. DF was classified based on criteria by DHS Kerala [Table 1].

Inclusion Criteria

The following criteria were included in the study:

1. Age more than 13 years
2. Dengue confirmed by NS1Ag test or IgM dengue or both NS1Ag and IgM.

Exclusion Criteria

The following criteria were excluded from the study:

1. All other cases of acute febrile illness
2. Patients with bleeding disorders
3. Patients with cardiac/liver/respiratory diseases
4. Patients already having severe dengue
5. Malnourished patients.

Data Management and Statistical Analysis

Data were coded and entered into Microsoft Excel. The analysis was done using SPSS software. Quantitative variables were summarized using mean and standard deviation. Association between quantitative variables was tested using *t*-test and ANOVA.

Ethical Issues

Only the patients who gave consent were included in the study. Ethical clearance was obtained from the ethical committee.

OBSERVATIONS AND RESULTS

Of the 120 patients studied, 84 were male and 36 were female [Table 2]. DF was seen more among males. The age range of patients was 14–83 years, and the mean age was 33.52 years. Moderate dengue was seen more compared to mild and severe dengue [Table 3]. The mean serum albumin of dengue patients on the day of admission was 3.61 g/dl and on the 3rd day of admission was 3.48 g/dl [Table 4]. The mean albumin on the day of admission was 3.71 g/dl, 3.60 g/dl, and 3.34 g/dl for mild, moderate, and severe dengue, respectively [Table 5]. The mean albumin on the 3rd day of admission was 3.62 g/dl, 3.47 g/dl, and 3.19 g/dl for mild, moderate, and severe dengue patients, respectively [Graph 1]. As the severity of dengue increased, the mean day 1 and day 3 albumin levels decreased and were statistically significant [Tables 6 and 7]. Hypoalbuminemia (<3.5 g/dl) was seen on day 1 in 34.8%, 34%, and 57.1% among mild, moderate, and severe dengue patients, respectively ($P = 0.148$). There was no significant association of hypoalbuminemia on day 1 with the severity of dengue [Table 8]. Hypoalbuminemia was seen on day 3 in 26.1%, 47.2%, and 81% of mild, moderate, and severe dengue patients. On day 3, the proportion of hypoalbuminemia increased as the severity of dengue increased and was statistically significant [Table 9]. There was no association between the outcome of the patients and dengue severity. There were no deaths in the study population.

DISCUSSION

Male preponderance was seen in this study. It was similar to a study conducted by Shiji *et al.* in Kerala, where 72% of the patients were males.[4] This could be due to the fact that males predominantly go out in the day time when the carrier *A. aegypti* bites them. Males outnumbered females in the majority of the reports of dengue outbreaks in India, and in a few studies, all from Delhi, the male-to-female ratio was as high as 3–5:1. The significance of this finding is unclear.[5-9]

Hypoalbuminemia has been described with dengue infections and is an indicator of severity.[10] The mean serum albumin concentration in the present study was 3.61 g/dl on the day of admission. Bhagyamma *et al.* showed that the mean serum albumin levels among dengue patients were 3.13 g/dl.[11] A study by Singh *et al.*, on 214 dengue patients in a tertiary hospital in Punjab,

Table 1: Dengue case classification

Mild	Moderate	Severe
Nausea, vomiting	Abdominal pain or tenderness	Severe plasma leakage leading to:
Rash	Persistent vomiting	Shock (dengue shock syndrome)
Aches and pains	Mucosal bleed	Fluid accumulation with respiratory distress
Tourniquet test positive	Lethargy, restlessness	Severe bleeding
Leukopenia	Liver enlargement >2 cm	Severe organ involvement
	Increase in Hematocrit	Liver: AST or ALT ≥1000
	Concurrent with rapid decrease	CNS: Impaired consciousness
	In platelet count	Heart and other organs
	Clinical fluid accumulation	
	With comorbid conditions such as old age, diabetes, hypertension, pregnancy, CAD, hemoglobinopathies, immunocompromised patients, patients on steroids, anticoagulants, or immunosuppressants	

Table 2: Percentage distribution of the sample according to sex

Sex	Frequency	Percentage
Male	84	70
Female	36	30
Total	120	100

Table 3: Percentage distribution of the sample according to dengue severity

Severity	Frequency	Percentage
Mild	46	38.3
Moderate	53	44.2
Severe	21	17.5
Total	120	100.0

Table 4: Descriptive of day 1 and day 3 albumin among the study subjects

Day	Mean albumin (g/dl)	Standard deviation	95% Confidence interval
Day 1	3.61	0.4363	3.522–3.680
Day 3	3.48	0.4170	3.405–3.555

India, showed that the mean serum albumin was 3.2 g/dl. The mean albumin levels in DF, dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS) were 3.3 g/dl, 3 g/dl, and 2.7 g/dl, respectively. There was also a significant fall in serum albumin levels in DSS patients compared to DHF patients.[12]

Another study by Jnaneshwari *et al.* among 166 patients in Bangalore also showed that the mean serum albumin was 3.52 g/dl, and there was also a significant fall in serum albumin levels as the severity of dengue increased. The mean serum albumin levels in different groups were 3.61 g/dl, 3.31 g/dl, and 2.71 g/dl in DF, DHF, and DSS, respectively.[13]

Table 5: Descriptive of day 1 and day 3 albumin according to the severity of dengue

Severity	*n*	Mean	Standard deviation	95% Confidence interval
Day 1 albumin				
Mild	46	3.711	0.4478	3.578–3.844
Moderate	53	3.608	0.3736	3.505–3.711
Severe	21	3.343	0.4697	3.129–3.557
Day 3 albumin				
Mild	46	3.622	0.3988	3.503–3.740
Moderate	53	3.472	0.4059	3.360–3.584
Severe	21	3.190	0.3375	3.037–3.344

Table 6: Comparison of mean day 1 albumin according to dengue severity

Severity	*n*	Mean albumin day 1 (g/dl)	F	*P*-value
Mild	46	3.71	5.5	0.005
Moderate	53	3.60		
Severe	21	3.34		

Table 7: Comparison of mean day 3 albumin according to dengue severity

Severity	*n*	Mean albumin day 3	F	*P*-value
Mild	46	3.62	8.73	0.001
Moderate	53	3.47		
Severe	21	3.19		

However, a study by Reddy and Roshan, on 100 dengue patients attending a Tertiary Care Hospital in Mangalore, India, showed that even though serum albumin was low in severe dengue compared to non-severe dengue, it was not statistically significant. The mean serum albumin was 3.76 g/dl in the total population with 3.55 g/dl and 3.77 g/dl for severe and non-severe dengue patients, respectively.[14] Villar-Centeno *et al.* showed that albuminemia >4 g/dl was associated with a lower risk of DHF.[15]

Table 8: Hypoalbuminemia on day 1 in dengue patients

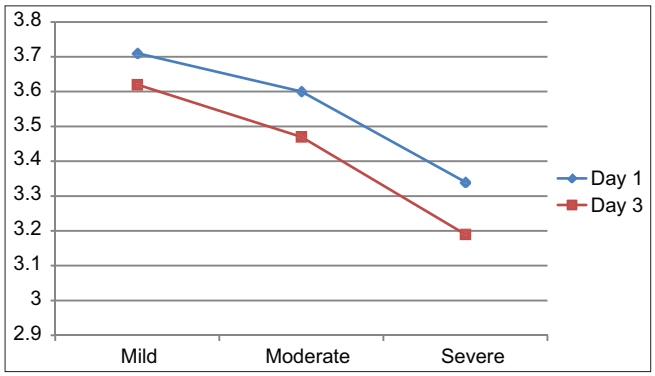
Dengue type	Hypoalbuminemia	Normal	Total
Mild			
Count	16	30	46
Percent	34.8%	65.2%	100.0%
Moderate			
Count	18	35	53
Percent	34.0%	66.0%	100.0%
Severe			
Count	12	9	21
Percent	57.1%	42.9%	100.0%
Total			
Count	46	74	120
Percent	38.3%	61.7%	100.0%

χ^2=3.817, P=0.148

Table 9: Hypoalbuminemia on day 3 in dengue patients

Dengue type	Hypoalbuminemia	Normal	Total
Mild			
Count	12	34	46
Percent	26.1%	73.9%	100.0%
Moderate			
Count	25	28	53
Percent	47.2%	52.8%	100.0%
Severe			
Count	17	4	21
Percent	81.0%	19.0%	100.0%
Total			
Count	54	66	120
Percent	45.0%	55.0%	100.0%

χ^2=17.716, P≤0.001



Graph 1: Comparison of mean day 1 and day 3 albumin according to dengue severity

CONCLUSIONS

It was seen that as the severity of dengue increased, there was a fall in serum albumin levels and it was statistically significant. The fall in albumin levels was seen even on the day of admission and persisted on day 3 as well. The mean albumin levels on day 3 of admission were lower than admission day albumin levels for mild, moderate, and severe dengue patients. Serum albumin is a cheap and easily available laboratory test, and its measurement can be used in the peripheral hospitals as a prognostic marker of dengue severity. This helps in early referral to the higher center if the albumin levels are low.

Limitations of the Study

- The study was 1 year only
- Small sample size
- There was no mortality in the cases studied because the study was done in a tertiary care center with adequate facilities
- Being a tertiary care center in a metro city, the study might not always represent an actual situation in the community.

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Original Article

Clinical Study on Findings of Ultrasound and Computed Tomography Scan in the Diagnosis of Ovarian Mass Lesions

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Abstract

Background: Ultrasonography (USG) is a simple and noninvasive diagnostic tool that gives lots of data to accurately characterize most of the ovarian mass lesions with a sensitivity and specificity of 88–96% and 90–96%, respectively. However, the presence of significant variability in the terminology and definition of USG findings has led to the need for more standardization and uniformity in adnexal USG. Computed tomography (CT) scan is used primarily in patients with ovarian malignancies, either to assess disease extent before surgery or as a substitute for second-look laparotomy. Moreover, spiral CT has several advantages such as its rapidity and possibility of identifying all potential sites of peritoneal implants or lymphadenopathy as well as of the primary tumor site.

Aim of the Study: The study was to the clinical findings of both USG and CT scan of abdomen and pelvis in the accurate diagnosis of ovarian mass lesions.

Materials and Methods: A total of 104 patients with mass lesions of the ovary were included and subjected to USG and CT scan of abdomen and pelvis. Transabdominal and transvaginal USG studies were undertaken in all the patients. USG findings and CT scan findings were observed recorded and analyzed. Ovarian pathologies were categorized as benign, malignant, and metastasized and the results of CT and USG were compared.

Observations and Results: A total of 104 patients with ovarian mass lesions attending the Radiology Department of a Tertiary Teaching Hospital in Kerala were included in the study; patients were aged between 18 and 68 years with a mean age of 42.46 ± 5.70 years. Patients aged between 19 and 58 years accounted for more than 80% of the entire subjects. Hemorrhagic cyst was the most common mass lesion diagnosed in this study and accounted for 28 (26.92%) patients. Tubo-ovarian abscess accounted for 19/104 (18.26%) of the total cases. This was followed by mucinous cystadenoma 17/104 (16.34%), serous cystadenoma in 13/104 (12.50%) cases, polycystic ovarian disease in 11/104 (10.57%), mature cystic teratoma in 7/104 (6.73%), simple cyst in 6 (5.76%), Brenner tumor in 2/104 (1.92%), and endometrioma in 1/104 (0.96%) patients.

Conclusions: CT scan and USG are two excellent noninvasive methods to differentiate ovarian mass lesions from benign and malignant lesions and both imaging techniques seemed to be comparable in differentiating malignant from benign ovarian tumors. CT scan was more sensitive than USG, but sonography is more specific than CT scan in diagnosis of malignant lesions. USG has high positive predictive value as compared to CT scan to diagnose malignant lesions.

Key words: Computed tomography scan, Malignancy and metastases, Ovarian tumors, Ultrasonography

INTRODUCTION

Ultrasonography (USG) is the primary imaging modality used by the physicians to identify and characterize ovarian mass lesions.[1,2] Based on the USG findings, accurate characterization of about 90% of ovarian mass lesions is possible with the collective experience from numerous centers worldwide.[3] Accurate characterization of ovarian mass lesions is important both to determine the indication for surgery and to help define the type of surgery and whether a surgical subspecialist is needed.[4] The approaches to characterize the ovarian mass lesions include subjective assessment, simple scoring systems, statistically derived scoring systems, or probability predictors based on logistic regression analysis, and more complex mathematical models such as neural networks.[5]

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Among them, the subjective approach, also called a pattern recognition approach, was shown to be superior to other methods, with a sensitivity of 88–100% and specificity of 62–96% for predicting malignancy.[6-8] In addition to USG findings while determining the risk of malignancy for an ovarian mass lesion associated factors such as patient's age, menopausal status, personal or family history of breast or ovarian cancer, and serum CA-125 level should also be considered. The majority of ovarian mass lesions especially in premenopausal women are benign.[3,9-12] Usually, computed tomography (CT) scan is the investigation of choice in planning further management in patients who are diagnosed with the help of USG and believed to have metastatic disease. Spiral CT scan or multidetector CT (MDCT) also allows a comprehensive evaluation of primary tumor and the site of peritoneal metastasis and lymphadenopathy. CT scan helps to differentiate ovarian masses with features pertaining to benignity and malignancy.[13] CT scan also allows use of oral contrast agent to distend and mark the bowel and help differentiate bowel from peritoneal implants, which gives this modality a major advantage over US and magnetic resonance imaging. For these reasons, CT is a very attractive method for evaluating the extent of disease in women with ovarian malignancy. However, available studies have not demonstrated that CT is significantly superior to other modalities in staging ovarian malignancy.[14-16] Ovaries are the third most common sites of primary malignancy in female genital tract after cervix and endometrium accounting for 30% of all cancers of female genital tract. Ovaries are subjected to monthly endocrine and traumatic insult during ovulatory cycle and are a prime site for tumor genesis. About 50% of ovarian tumors are benign tumors. Of the rest, 90% are epithelial and remaining 10% are those resulting from metastasis.[17] There is very little data available for correlation studies between USG and CT of ovarian lesions. The present paper is focused to study the USG and CT scan features in patients to predict malignancy and how the features differ in benign mass lesions of ovary. This study was conducted with a view to find out the diagnostic value of USG and CT and its correlation with histopathological diagnosis.

MATERIALS AND METHODS

A total of 104 patients with ovarian mass lesions attending the radiology department for USG and CT scan referred from Obstetrics and Gynaecology (OBG) and general surgery department were included in the study. An ethical committee clearance was obtained before the commencement of the study. An ethical committee cleared consent pro forma was used for the entire study. Inclusion Criteria: (1) Female patients aged between 9 and 68 years were included in the study. (2) Patients with mass lesions of ovary presenting with lump abdomen were included in the study. (3) Patients who were diagnosed to have ovarian mass lesions incidentally were included in the study. Exclusion Criteria: (1) Patients who are not willing to for written consent were excluded from the study. (2) Patients who have undergone gynecological surgery previously for ovarian mass lesions were excluded from the study. (3) Patients aged <9 and more than 68 years were excluded from the study. All the patients were inquired of clinical history, general surgery, and gynecological examination before subjecting to USG and CT scan. The following investigations were undertaken in all the patients: (1) Complete blood picture including hemoglobin, total and differential count, and erythrocyte sedimentation rate. (2) Renal function tests: blood urea and serum creatinine. (3) Random blood sugar estimation; fasting blood sugar and 2 h postprandial if required; and viral screening and hepatitis tests. Radiological investigations included: (1) Transabdominal USG with full bladder. (2) Transvaginal USG wherever required. (3) Contrast enhanced CT scan of abdomen and pelvis with 16-slice GE spiral CT scan machine. The radiological features of USG and CT scan were compared and correlated in each patient to adjudge their accuracy in diagnosing the ovarian diseases and the nature and degree of echotexture displayed by each method. All the data were recorded and analyzed using standard statistical methods.

Type of Study

This was a cross-sectional, prospective, and analytical study.

Institute of Study

This study was conducted at Al Azhar Medical College and Super specialty Hospital, Thodapuzha, Kerala.

Period of Study

This study was from June 2018 to December 2019.

OBSERVATIONS AND RESULTS

Totally 104 patients with ovarian mass lesions attending the Radiology Department of a Tertiary Teaching Hospital in Kerala were included in this study. Patients were aged between 18 and 68 years with a mean age of 42.46 ± 5.70 years. Patients aged between 19 and 58 years accounted for more than 80% of the entire subjects [Table 1].

Various radiological diagnoses of ovarian mass lesions in the study were tabulated in Table 2. Hemorrhagic cyst was the most common mass lesion diagnosed in this study and accounted for 28 (26.92%) patients. Tubo-ovarian abscess accounted for 19/104 (18.26%) of the total cases. This was followed by mucinous cystadenoma 17/104 (16.34%), serous cystadenoma in 13/104 (12.50%) cases, polycystic

ovarian disease (PCOD) in 11/104 (10.57%), mature cystic teratoma in 7/104 (6.73%), simple cyst in 6 (5.76%), Brenner tumor in 2/104 (1.92%), and endometrioma in 1/104 (0.96%) patients. The peak incidence of ovarian masses was observed between 29 and 48 years of age groups [Table 2]. In extremes of age groups between 9–18 years and 59–68 years, the incidence was 4.80% and 11.53%, respectively [Table 2].

The radiological features of USG and CT scan were compared and correlated in each patient to adjudge their accuracy in diagnosing the ovarian diseases and the nature and degree of echotexture displayed by each method. 94/104 (90.38%) ovarian mass lesions in this study were benign in nature. Among these benign conditions hemorrhagic cyst was observed in 28/94 (29.78%) patients, tubo-ovarian abscess was found in 19/94 (20.21%) of patients, mucinous cystadenoma was found in 17/94 (18.08%) patients, serous cystadenoma in 13/94 (13.82%), PCOD in 11/94 (11.70%) of patients, and simple cyst in 6/81 (6.38%) [Table 3].

Among the remaining, 10 patients malignant mass lesions of the ovary were observed. Among them, mature cystic teratoma with malignant transformation was observed in 7/104 (6.73% of the patients, Brenner tumor was seen in 2/104 (1.92%), and endometrioma in 1/104 (0.96%) of the patients [Table 4].

Infertility was seen in 100% patients of PCOD patients. Association between CA 125 and the mass lesions of the ovary in this study was observed and found that it was present in 80% (8/10) of the malignant masses and 20/94 (21.27%) benign mass lesions of ovary. Incidentally, CA 125 was found positive in 3/19 (tubo-ovarian abscess patients). The findings of USG were described as hyperechoic, hypoechoic, lesions with septations, ascites, increased thickness of wall, and inner wall structures. The incidence of radiological features observed in benign and malignant mass lesions in this study was tabulated in Table 5.

The radiological findings of mass lesions of ovary on CT scan were described in the following terms: Calcification in the tumor masses associated peritoneal deposits, ascites, enhancement, and metastases. The incidence of these radiological features was tabulated in Table 6.

Comparison of pathological diagnosis of mass lesions of the ovary was done using the findings of USG and CT scan and correctness of the diagnosis was calculated and it was found in this study that of 94 benign lesions of ovary 89 (94.68%) were correctly diagnosed on USG examination of patients and 85/94 (90.42%) patients were correctly diagnosed on CT scan. Among the 10 malignant lesions, all (100%) were diagnosed by CT scan and 8/10 (80%) by USG examination. The overall accuracy of USG was 89/104 (85.57%) and overall accuracy of CT scan was 85/104 (90.42%) [Table 7].

DISCUSSION

Ovarian mass lesions are a common occurrence in radiological clinical practice. The mass lesions of ovary

Table 1: The demographic data of the study group (*n*-104)

Age group in years	Number	Percentage
09–18	5	4.80
19–28	16	15.38
29–38	29	27.88
39–48	24	23.07
49–58	18	17.30
59–68	12	11.53

Table 2: The radiological diagnoses made in the study (*n*-104)

Radiological diagnosis	Number (%)
Hemorrhagic cyst	28 (26.92)
Tubo-ovarian abscess	19 (18.26)
Mucinous cystadenoma	17 (16.34)
Serous cystadenoma	13 (12.50)
Polycystic ovarian disease	11 (10.57)
Mature cystic teratoma	7 (6.73)
Simple cyst	6 (5.76)
Brenner tumor	2 (1.92)
Endometrioma	1 (0.96)

Table 3: The incidence of various types of benign mass lesions of the ovary in the subjects (*n*-94 and 104)

Radiological diagnosis	Number	Percentage	Overall percentage
Hemorrhagic cyst	28	29.78	26.92
Tubo-ovarian abscess	19	20.21	18.26
Mucinous cystadenoma	17	18.08	16.34
Serous cystadenoma	13	13.82	12.50
Polycystic ovarian disease	11	11.70	10.57
Simple cyst	6	6.38	05.76

Table 4: The incidence of various types of malignant mass lesions of the ovary in the subjects (*n*-10 and 104)

Radiological diagnosis	Number	Percentage	Overall percentage
Mature cystic teratoma	7	70	6.73
Brenner tumor	2	20	1.92
Endometrioma	1	10	0.96

Table 5: The ultrasonography findings in benign and malignant diseases of mass lesions of ovary (*n*-94)

Nature of mass lesions	ECHO			Wall thickness	Septations	Inner wall structures		Ascites
	Hyper	Hypo	Mixed	<3 mm	>3 mm	Smooth	Irregular	-
Benign masses	39	37	15	41	54	38	56	15
Malignancy	2	6	1	1	9	3	7	8

Table 6: The computed tomography scan findings in benign and malignant diseases of mass lesions of ovary (*n*-94)

Radiological findings	Benign	Malignant
Calcification	17	6
Peritoneal deposits	0	4
Ascitis	15	8
Enhancement	31	10
Metastases	2	10

Table 7: The accuracy of USG and CT scan investigations in diagnosing benign and malignant mass lesions of ovary (*n*-104)

Diagnosis	Number	Accurately diagnosed with USG (%)	Accurately diagnosed with CT scan (%)
Benign	94	89 (94.68)	85 (90.42)
Malignant	10	08 (80)	10 (100)
Total	104	97 (93.26)	95 (91.34)

USG: Ultrasonography, CT: Computed tomography

may be benign or malignant and sometimes borderline in nature. Whenever, the patients present with mass lesions of ovary, the role of radiologist is to opine whether it is benign or malignant and if it is malignant to give the exact extent of the lesion.[18,19] Accurate diagnosis by the radiologist helps the surgeon to avoid surgery and cost to the patient. In malignant lesions, accurate staging helps in cost-effectiveness of the treatment and further post-operative planning.[20,21] A review of literature shows that sometimes CT scan underestimates the staging and pelvic examination by the surgeon and serum CA-125 are of limited value in the diagnosis of pelvic masses and their sensitivity is often below 50%.[20] The sensitivity of morphologic analysis with ultrasound in predicting malignancy in ovarian tumors has been shown to be 85–97%, whereas its specificity ranges from 56% to 95%.[21-23] In the present paper, of 94 benign lesions of ovary 89 (94.68%) were correctly diagnosed on USG examination of patients and 85/94 (90.42%) patients were correctly diagnosed on CT scan. Among the 10 malignant lesions, all (100%) were diagnosed by CT scan and 8/10 (80%) by USG examination. The overall accuracy of USG was 89/104 (85.57%) and overall accuracy of CT scan was 85/104 (90.42%) [Table 7]. A meta-analysis conducted by Kinkel *et al*. described that CT shows sensitivity and specificity of 81% and 87%, respectively, when used for indeterminate masses seen on ultrasound.[24] Similarly, Lin *et al*. reported that positron emission tomography/CT scanner shows a sensitivity of 87% and specificity of 100% for differentiating benign from malignant ovarian cancers.[24,25] USG was useful in distinguishing cystic from solid mass lesions and exact localization and near accurate pathological diagnosis of ovarian mass lesions.[26] In a few studies, USG could achieve accurate diagnosis in 75–95% of the mass lesions of the ovary.[27-29] All unilocular ovarian cysts in the present study were benign on histopathological examination irrespective of size. Meire *et a1*.[30] have described a 10.5% incidence of malignancy in unilocular tumors more than 5 cm in diameter. Multiloculation, thick septa, and solid nodules are reliable indicators of malignancy on USG.[30] In the present paper, of 94 benign lesions of ovary 89 (94.68%) were correctly diagnosed on USG examination of patients. An ovarian dermoid can be diagnosed by its typical appearance of a complex adnexal mass with clusters of highly reflective dense echoes within the lesion.[31]

CONCLUSIONS

CT scan and USG are two excellent noninvasive methods to differentiate ovarian mass lesions from benign and malignant lesions and both imaging techniques seemed to be comparable in differentiating malignant from benign ovarian tumors. CT scan was more sensitive than USG, but sonography is more specific than CT scan in diagnosis of malignant lesions. USG has a high positive predictive value as compared to CT scan to diagnose malignant lesions.

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Original Article

A Clinical Analysis of Acute Small Bowel Obstruction – A Review of Sixty-four Patients in a Tertiary Hospital

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Abstract

Background: Acute small bowel obstruction (SBO) is an ever increasing clinical problem. Successful management depends on comprehensive knowledge of the aetiology and patho-physiology of SBO, familiarity with imaging methods, good clinical judgment, and sound technical skills.

Aim of the Study: To study the incidence, clinical features, and operative findings of small bowel obstruction in a Tertiary Hospital of Kerala.

Materials and Methods: A prospective cross-sectional analytical study was conducted in the Department of General Surgery, Medical College, Kerala, including 64 patients. Inclusion criteria: (1) Patients aged between 18 and 87 years were included in the study. (2) Patients with complaints of vomiting, pain in the abdomen, fever, and abdominal distension were included. (3) Patients who had hernia with recent onset of irreducibility, pain, vomiting, and constipation were included in the study. Exclusion criteria: (1) Patients who were aged below 18 and above 80 years were excluded from the study. (2) Patients with signs and symptoms of subacute intestinal obstruction (IO) and paralytic ileus were excluded from the study. The following data were collected: A detailed record of the patient's history, physical examination, and necessary investigations such as baseline, X-ray abdomen erect and supine in all cases, and ultrasound abdomen was recorded based on the requirement for each case. The pro forma was used to record the age, sex, and symptom duration, past surgical and medical history of all patients. All patients were subjected to surgery as their clinical presentation was of acute nature. The patients were stabilized from shock, fluid-electrolyte imbalances, and nasogastric aspiration before taking them to the operation theater. All the patients were followed postoperatively for 2–4 months from the time of discharge. The events of post-operative period and complications were noted and tabulated. All the data were analyzed using standard statistical methods.

Observations and Results: A total of 64 patients presenting with acute IO were included in the study. Among the 64 patients, there were 49 male (76.56%) and 15 female (23.43%) with a male to female ratio of 3.26:1. The mean age of the patients was 49.36 ± 3.14 years. The youngest patient was aged 19 years and the eldest one was 76 years. It was observed that pain in the abdomen accounted for the most common symptom with 60/64 patients presenting with the symptom, followed by abdominal distension 49/64 (76.56%), vomiting in 43/64 (66.15%), and absent bowel sounds in 28/64 (43.75%) of the patients. Among the causes for small bowel obstruction (50/64), intussusceptions were noted in 13/64 (20.31%), volvulus in 10/64 (15.62%), adhesions in 8/64 (12.50%), hernia in 7/64 (10.93%), appendicitis in 6/64 (9.37%), and intestinal tuberculosis in 6/64 (9.37%) of the patients. Among the large bowel obstructions, volvulus was noted in 7/64 (10.93%), intussusceptions in 4/64 (06.25%), and large bowel tumor in 3/64 (4.68%) of the patients. Paralytic ileus was noted in 10/64 (15.62%) of the patients.

Conclusions: Acute IO is a common surgical emergency requiring timely intervention to reduce morbidity and mortality. Acute IO is more common in small bowel when compared to large bowel. Males are more commonly affected than females. The clinical presentation varies on the level of obstruction and hence the incidence of symptoms varies from study to study. Intussusceptions, volvulus, herniae, and adhesions account for more than 50% of the causes of IO. Laparotomy was the most common means of IO management, while bowel resection and anastomosis were the most common intraoperative procedure. Early recognition and timely intervention are important to prevent the bowel going for gangrenous changes. Mortality increases with the delay in the institution of surgical or medical treatment.

Key words: Intestinal obstruction, Intussusceptions and laparotomy, Paralytic ileus, Volvulus

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INTRODUCTION

IO is defined as an obstruction to the flow of its intraluminal contents.[1] It can occur due to abnormal intestinal physiology or due to mechanical obstruction. It can present in acute or chronic forms.[2,3] In prolonged intestinal obstruction (IO) bowel dilation and retention of fluid within the lumen

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proximal to the obstruction occurs, whereas distal to the obstruction, its luminal contents pass down the bowel decompressing it. In extreme cases of IO bowel dilation or strangulation occur leading to impaired perfusion to the resulting in necrosis or perforation of the bowel. Such complications increase the mortality associated with small bowel obstruction.[4] The most common causes of mechanical small bowel obstruction are post-operative adhesions and hernias. Other etiologies are diseases intrinsic to the wall of the small intestine (e.g., tumors, stricture, and intramural hematoma) and processes that cause intraluminal obstruction (e.g., intussusceptions, gallstones, and foreign bodies),[5] emergency operation being defined as those types of surgeries that should be performed by necessity within 24 h of a patient's admission, or within 24 h of the development of a specific complication.[5] Of all IO cases, mechanical IO forms an important part of pathologies that necessitate emergency surgical interventions in parts of Asia, including India, Iran, and Pakistan.[5-7] Recurrence of IO may occur in about 12% of patients after primary conservative treatment and in between 8% and 32% of patients after operative management for adhesive bowel obstruction.[3,7] IO occurs in 80% of cases in the small bowel, while in 20% of cases, it occurs in the large intestine.[1] The four cardinal features of IO are: Colicky abdominal pain, distension, vomiting, and constipation. The presentation of these symptoms is affected by the site and type of obstruction.[4,8] In simple IO, apart from luminal flow obstruction, there is no compromise of its vascular supply.[9] However, important and progressive changes occur in the bacteriologic content of obstructed bowel; gas accumulates with altered volume and composition above obstruction, changes in circulation of the distended bowel, and changes in the complex fluid and electrolyte fluxes.[10] When strangulation complicates the situation such pathological changes are augmented by the progressive vascular changes in the affected intestine and its mesentery and eventually lead to toxemia associated with actual death of gut wall.[11] Initial gaseous distension is due to significant overgrowth of both aerobic and anaerobic bacteria producing considerable gas. Swallowed air constitutes the largest sum of intestinal air whose constituents are nitrogen (80%) followed by hydrogen sulfide.[12] The reason for fluid accumulates above the level of obstruction is partly due to deprivation of absorptive surface of the intestine distal to the occlusion and partly due to alteration in fluid and electrolytes across gut wall above the obstruction.[13] Due to edema and inflammation in the obstructed intestine, absorption of 24 h secretions amounting to 7–8 l (gastric, biliary, pancreatic, and small intestinal secretions) pour into it resulting in sequestration of fluid from the circulation and due to lack of surface for absorption. The bacteria multiply rapidly and the toxins released cause toxemia. Toxemia leads to severe dehydration and electrolytic imbalance.[14] Early recognition of intestinal strangulation in patients with mechanical bowel obstruction is important to decide whether to perform an emergency surgery or to allow safe nonoperative management of carefully selected patients.[15-18] Close and careful clinical evaluation, in conjunction with laboratory and radiologic studies, is essential for the decision making in proper management of patients with acute mechanical bowel obstruction;[19] a pre-operative diagnosis of bowel strangulation cannot be made or excluded reliably by any known parameter, combinations of parameters, or by experienced clinical judgment.[20-22] The mainstay of treatment in IO includes gastroduodenal suction, intravenous fluid administration, and operative correction. In this context, a prospective clinical study was conducted to highlight the common causes of IO, its clinical features, causes, and role of early surgical intervention.

Type of Study: A cross sectional prospective analytical study

Institute of Study: Department of General Surgery, Kerala

Period of study: June 2018 to December 2019.

MATERIALS AND METHODS

A prospective cross-sectional analytical study was conducted in the Department of General Surgery, Al Azhar Medical College, Thodapuzha, Kerala, including 64 patients. An ethical committee clearance certificate was obtained before the commencement of the study; an ethical committee approved consent pro forma was used for the study.

Inclusion Criteria

(1) Patients aged between 18 and 87 years were included in the study. (2) Patients with complaints of vomiting, pain in the abdomen, fever, and abdominal distension were included in the study. (3) Patients who had hernia with recent onset of irreducibility, pain, vomiting, and constipation were included in the study.

Exclusion Criteria

(1) Patients who were aged below 18 and above 80 years were excluded from the study. (2) Patients with signs and symptoms of subacute IO and paralytic ileus were excluded from the study. For all the patients data collection included – a detailed record of the patient`s history, physical examination, and necessary investigations such as baseline, X-ray abdomen erect and supine in all cases, ultrasound abdomen, CT scan abdomen with or without contrast were recorded based on the requirement for each case. The pro forma was used to record the age, sex, and symptom duration in the past surgical and medical history of all patients. All patients were subjected to surgery as their clinical presentation was

of acute nature. The patients were stabilized from shock, fluid-electrolyte imbalances, and nasogastric aspiration before taking them to the operation theater. All the patients were followed postoperatively for 2–4 months from the time of discharge. The events of post-operative period and complications were noted and tabulated. All the data were analyzed using standard statistical methods.

OBSERVATIONS AND RESULTS

A total of 64 patients attending the department of general surgery of a tertiary teaching hospital and presenting with acute IO were included in this study. Among the 64 patients, there were 49 male (76.56%) and 15 female (23.43%) with a male to female ratio of 3.26:1. The mean age of the patients was 49.36 ± 3.14 years. The youngest patient was aged 19 years and the eldest one was 76 years. Distribution of the patients according to their age groups and gender was tabulated in Table 1.

The symptoms and signs with which these 64 patients were presented to the emergency room were noted in the pro forma and analyzed and tabulated in Table 2. In the study, it was observed that pain in the abdomen accounted for the most common symptom with 60/64 patients presenting with the symptom, followed by abdominal distension 49/64 (76.56%), vomiting in 43/64 (66.15%), and absent bowel sounds in 28/64 (43.75%) of the patients.

The types of IO and its prevalence were noted and tabulated in Table 3. Mechanical obstruction was noted in 54/64 (84.375) of the patients and paralytic ileus was noted in 10/64 (15.62%) of the patients. Small bowel obstruction was noted in 50/64 (78.12%) and large bowel obstruction was noted in 14/64 (21.87%) of the patients. The previous history of IO was noted in 37/64 (57.81%) of then patients. Previous history and surgery of adhesions were noted in 48/64 (75%) of the patients [Table 3].

Analysis of the study showed that among the causes for small bowel obstruction (50/64), intussusceptions were noted in 13/64 (20.31%), volvulus in 10/64 (15.62%), adhesions in 8/64 (12.50%), hernia in 7/64 (10.93%), appendicitis in 6/64 (9.37%), and intestinal tuberculosis (TB) in 6/64 (09.37%) of the patients. Among the large bowel obstructions, volvulus was noted in 7/64 (10.93%), intussusceptions in 4/64 (06.25%), and large bowel tumor in 3/64 (4.68%) of the patients. Paralytic ileus was noted in 10/64 (15.62%) of the patients [Table 4].

Among the various methods of surgical and medical management strategies used in the study showed that small bowel obstruction management was done by resection and anastomosis of the bowel in 11/64 (17.18%), adhesiolysis in 10/64 (15.62%), hernia repair in 7/64 (10.93%), band

Table 1: The age and gender distribution (*n*-64)

Age group (years)	Male – 49 (76.56%)	Female – 15 (23.43%)
18–27	5- (10.20)	2- (13.33)
28–37	7- (14.28)	2- (13.33)
38–47	11- (22.44)	3- (20)
48–57	13- (26.53)	2- (13.33)
58–67	6- (12.24)	2- (13.33)
68–77	2- (04.08)	1- (06.66)
78–87	1- (02.04)	3- (20)

Table 2: The symptoms and signs of the subjects in the study (*n*-64)

Symptoms and signs	No. of cases	Total percentage
Pain abdomen	60	92.30
Vomiting	43	66.15
Tenderness	26	40.62
Abdominal distention	49	76.56
Constipation	12	18.75
Increased bowel sounds	16	25
Absent bowel sounds	28	43.75
Decreased bowel sounds	21	32.81
Groin swelling	10	15.62
Guarding+Rigidity	22	34.37
Palpable mass	09	14.06

Table 3: The type of IO and its prevalence (*n*-64)

Observation	Number (%)
Type of obstruction	
Mechanical	54 (84.37)
Paralytic ileus	10 (15.62)
IO and its prevalence	
Small bowel obstruction	50 (78.12)
Large bowel obstruction	14 (21.87)
Previous history of obstruction	
No	37 (57.81)
Yes	27 (42.18)
Previous history of adhesion	
No	48 (75)
Yes	16 (25)

IO: Intestinal obstruction

Table 4: The causes of intestinal obstruction in the study (*n*-64)

Cause of obstruction	Number (%)
Small bowel intussusceptions	13 (20.31)
Small bowel volvulus	10 (15.62)
Adhesions	8 (12.50)
Hernia	7 (10.93)
Appendicitis	6 (9.37)
Intestinal tuberculosis	6 (9.37)
Large bowel volvulus	7 (10.93)
Large bowel intussusceptions	4 (6.25)
Large bowel tumor	3 (4.68)
Paralytic ileus	10 (15.62)

Table 5: The surgical and medical management modalities used in the study (*n*-64)

Operative findings and/or medical management	Number of cases (%)
Resection and anastomosis	11 (17.18)
Adhesiolysis	10 (15.62)
Hernia repair	7 (10.93)
Band release	6 (9.37)
Milking	7 (10.93)
Colostomy	5 (7.81)
Derotation and sigmoidopexy	4 (6.25)
Paralytic ileus	10 (15.62)

release in 6/64 (9.37%), and milking in 7/64 (10.93%) of the patients. Large bowel obstruction was managed by colostomy in 5/64 (7.81%) and derotation and sigmoidopexy in 4/64 (6.25%) of the patients. All the 10/64 patients with paralytic ileus were managed by conservative medical management [Table 5].

Among the 64 patients, two patients developed complications; one patient died due to septicemia and another due to respiratory infection (Pneumonia). The remaining 62 patients were followed up for 4 months without complications or recurrences.

DISCUSSION

This prospective cross-sectional analytical study was conducted between June 2018 and December 2019 in the department of general surgery of a teaching hospital, wherein the total number of out patient department patients attending was 12,841. This revealed the prevalence of IO to be 4.98% among all surgical patients admitted to surgical ward. All over the world, the prevalence rate of acute abdomen due to IO is estimated to be 1 % of all hospitalizations, 3 % of emergency surgical admissions to general hospitals, and 4 % of major colostomies are secondary to IO.[23] The incidence of IO is less common in the United States of America and Western Europe, whereas it is common in India, Pakistan, and other tropical countries.[24] IO is the leading cause of acute abdomen in several African countries, including Ethiopia.[7,25] Review of literature shows that there are wide variations in the prevalence of IO throughout the world depending on ethnicity, age group, dietary habits, and geographic location, among other factors; it varies from country to country and area to area in the same country.[23] The incidence of IO in this study showed that there were 49 male (76.56%) and 15 female (23.43%) with a male to female ratio of 3.26:1. The mean age of the patients was 49.36 ± 3.14 years. Fuzan[26] reported the mean age of 56 years. In a similar study by Souvik *et al.* and Budharaja *et al.*,[27,28] the gender discrepancy with males outnumbering females by a huge margin was observed (4:1). They concluded that it can be possibly due to a large number of their patients had obstructed inguinal hernia, and in their country, they mostly have males who suffer from this condition. Furthermore, women in rural India are mostly housewives which limit their exposure to tubercle bacilli in contrast to males. Furthermore, volvulus and malignant disease of the gastrointestinal tract are more common in males as compared to females. In this study, it was observed that pain in the abdomen accounted for the most common symptom with 60/64 patients presenting with the symptom, followed by abdominal distension 49/64 (76.56%), vomiting in 43/64 (66.15%), and absent bowel sounds in 28/64 (43.75%) of the patients. In similar studies reviewed in the literature, it was found that Budharaja *et al.*[28] reported that symptoms in the order of frequency were pain abdomen 95%, distention of abdomen 82%, vomiting 75%, and absolute constipation 50% constituting acute IO. Al Salamah *et al.*[29] in their study reported that symptoms in the order of frequency were pain abdomen 90%, distention of abdomen 80%, vomiting 72%, and absolute constipation 45% constituting acute IO. Analysis of the study showed that among the causes for small bowel obstruction (50/64), intussusceptions were noted in 13/64 (20.31%), volvulus in 10/64 (15.62%), adhesions in 8/64 (12.50%), hernia in 7/64 (10.93%), appendicitis in 6/64 (9.37%), and intestinal TB in 6/64 (9.37%) of the patients. Among the large bowel obstructions, volvulus was noted in 7/64 (10.93%), intussusceptions in 4/64 (6.25%), and large bowel tumor in 3/64 (4.68%) of the patients. Paralytic ileus was noted in 10/64 (15.62%) of the patients [Table 4]. Duron *et al.*[30] observed that adhesions were the cause for IO in 25.5%, whereas Ti and Yong reported post-operative adhesions and bands to the cause for IO in 23.8%.[31] Fuzan *et al.* from their study of 582 patients concluded that in 246 (42.2%) patients, the cause for IO was adhesions due to the previous operations.[26] In the series study by Sarr *et al.*[18] showed that hernia-related strangulation was present in 42% patients, whereas Ramachandran[32] reported 38.6% of overall incidence of strangulated small bowel obstruction with 21.4% of obstructed hernia in adults. Budharaja *et al.*[28] from his study concluded that the etiology of IO was common secondary to obstructed hernia (small bowel and large bowel) and it accounted for 33%. In his study, the incidence of gangrene was up to 22%. Sankaran[33] from his study of patients with volvulus observed that sigmoid volvulus was common accounting to 50% of cases, whereas Budharaja *et al.*[28] observed that 18.2% of IO was due to volvulus and in that 11.9% was due to small bowel volvulus and 6.19% due to large bowel volvulus. In a study by Sarkar and Sarkar,[34] 31% of IO patients required bowel resection due to gangrene, whereas Roggo and Ottinger[35] in their series observed twisted segment resulting in gangrenous bowel in 46% of patients. Ti and Yong[31] noted that carcinoma of descending colon and rectum constituted 37.2% of their cases resulting in IO. Among them, ascending colon and cecum constituted to 9.8%. Ti and Yong[31] observed from

their study of 261 patients an incidence of intussusceptions in 6.3% as a cause of IO. Another series by Kuruvilla *et al*.,[36] intussusceptions accounted for 6.3% of the cases of total IO. Intestinal TB was reported by Sircar *et al*.[37] in 5% of their cases with acute IO. Kappor *et al*.[38] reported from their 109 cases of intestinal TB an incidence of 8.2% of IO cases.

CONCLUSIONS

Acute IO is a common surgical emergency requiring timely intervention to reduce morbidity and mortality. Acute IO is more common in small bowel when compared to large bowel. Males are more commonly affected than females. The clinical presentation varies on the level of obstruction and hence the incidence of symptoms varies from study to study. Intussusceptions, volvulus, herniae, and adhesions account for more than 50% of the causes of IO. Laparotomy was the most common means of IO management, while bowel resection and anastomosis were the most common intraoperative procedure. Early recognition and timely intervention are important to prevent the bowel going for gangrenous changes. Mortality increases with the delay in the institution of surgical or medical treatment.

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Original Article

Pregnancy Outcome in Women with Sickle Cell Hemoglobinopathy and Normal Hemoglobin – A Case–Control Study

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Abstract

Introduction: Pregnancy in sickle cell disease (SCD) is associated with an increased risk of maternal and fetal morbidity and mortality.

Objective: The objective of this study was to study the maternal and perinatal outcome of pregnancy in women with SCD/trait.

Methods: This is a comparative study. Study group (subjects) consisted of 128 pregnant women with SCD/sickle cell trait who were attending the antenatal clinic or were admitted in obstetric wards and followed up until the 7th day after delivery. The control group consisted of 256 age and gravidity matched pregnant women who did not have SCD/trait recruited from the same hospital.

Results: Statistically significant complications during pregnancy included anemia, crisis, and preeclampsia. Incidence of preterm deliveries, cesarean section, adverse fetal outcome in terms of stillbirths intrauterine deaths early neonatal deaths, and low birth weight was not significantly higher in the study group than in the control group.

Conclusion: Incidence of preeclampsia (P = 0.0001) and congestive cardiac failure (P = 0.0001) was significantly high among the women with SCD.

Key words: Pregnancy outcome, Sickle cell disease, Sickle cell hemoglobinopathy, Sickle cell trait

INTRODUCTION

Pregnancy in women with sickle cell disease (SCD) is associated with increased adverse outcomes. Findings on the association between SCD and adverse pregnancy outcomes are conflicting, and the results do not address whether these associations are similar in both low- and high-income countries. World population report (1975) gives the incidence of anemia to be 100% among pregnant women in India.[1] Although it has declined over a period of time, it still persists at a higher level when compared to that in other countries. Sickle cell hemoglobinopathy and G6PD deficiency are additional factors that lead to or aggravate anemia during pregnancy. Both maternal and fetal risks are increased when women with SCD become pregnant. Sickle cell trait is also potentially dangerous in the presence of certain disease states, and in healthy persons under certain circumstances that lead to anoxia, dehydration, or physical stress. Advances in health care, technology, meticulous care, and coupled with close hematological consultation, have resulted in a major reduction in maternal mortality in women with SCD, but benefits to the fetus have been less striking. After preeclampsia, postpartum hemorrhage, and sickle cell anemia will surely attain an important position in maternal deaths in the next decade.[2]

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Aims and Objectives

This study was undertaken to assess the pregnancy outcome, complications related to pregnancy, mode of delivery, and perinatal outcome in women with SCD and trait and compare them with pregnancy outcome in non-SCD women.

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METHODS

This comparative study was carried out at a tertiary care hospital, at NKP Salve Institute of Medical Sciences, Nagpur, for 2 years from January 1, 2014, to December 31, 2015, after obtaining approval from the college ethical committee.

The study subjects were selected from the obstetric wards and antenatal clinics. Those antenatal women, who were diagnosed as having SCD or trait during antenatal visits or during routine health care or in the previous pregnancy or the early first trimester, were included in the study. Two controls were selected for each subject by matching age and gravidity of antenatal women.

A total of 42 women with SCD, 86 with sickle cell trait and 256 controls were recruited in their first trimester (i.e., first 12 weeks of pregnancy). Basic data, including socioeconomic status, caste, religion along with thorough obstetric history, any significant medical history and family history of SCD/trait, blood transfusions, and crisis, were recorded. Detailed clinical examination and blood and urine tests were carried out at the time of registration. These women were followed up in antenatal clinic and obstetric wards until 7th day after delivery for follow-up with regard to any complications, mode of delivery, and fetal outcome (age of gestation at birth, birth weight, and live birth/stillbirth) were analyzed and $P < 0.05$ was considered significant.

RESULTS

The mean hemoglobin level in the SS (homozygous sickling) group (7.425 ± 1.455 g/dL) was significantly lower as compared to that in the AS (heterozygous sickling) group (8.68 ± 1.0164 g/dL) and to that in the AA (nonsickling) group (9.243 ± 0.7112 g/dL). Furthermore, the mean hemoglobin level in the AS group was significantly lower than that in the AA group [Table 1].

As shown in Table 2, maternal complications were much more in women with SCD than women with normal hemoglobin. The risk of preterm labor was significantly associated with sickle cell trait, and the risk was twice in SCD as compared to thrice in sickle cell trait. Furthermore, the risk of congestive cardiac failure increases to 42 times that of preeclampsia increased 6 times and that of urinary tract infection twice in SCD as compared to normal subjects.

As shown in Table 3, LSCS may be a protective factor for AS patients as compared to normal subjects, their risk was significantly reduced (by 64%). On the other hand, though non-significant, the risk increased by 7% in SS patients.

As shown in Table 4, though non-significant, risk of intrauterine death and early neonatal death was 5 times higher and that of stillbirth 10 times high. Furthermore, a significant association was found with low birth weight (LBW) babies. The risk of LBW increases to 6 times in patients with SCD and twice that in sickle cell trait. Statistically significant number of babies with weight between 1501 g and 2000 g in SS and AS groups.

DISCUSSION

SCD is an important hereditary hemoglobinopathy, a disease characterized by the production of defective hemoglobin S (HbS).[1] Sickle cell Hb is produced by substitution of Valine by glutamic acid at position six of the β chain of the normal Hb. Gene mutation – when homozygous, the individual has sickle cell anemia (Hb SS); when heterozygous, the individual has sickle cell trait (Hb AS).[2] The abnormal HbS tends to polymerize on deoxygenation, and red blood cell containing HbS becomes less pliable and consequently deform into the sickle shape. SCD is a multisystem disorder, and the risk of sickle cell anemia during pregnancy includes an increase in preeclampsia, preterm birth and small-for-gestational-age infants, chronic hemolysis, postpartum hemorrhage, repeated infections, and growth retardation in addition to an acute life-threatening complication called crisis. Pain from ischemic necrosis of bone marrow or other organs usually becomes more frequent. Pulmonary

Table 1: Hemoglobin levels in GM/DL in SS/AS/AA groups

Hb (%)	SS (*n*=42)	Percentage	AS (*n*=86)	Percentage	AA (*n*=256)	Percentage
8.1–10 g	6	14.28	22	25.58	206	80.46
6.1–8 g	30	71.42	47	54.65	44	17.18
<6 g	6	14.28	17	19.76	6	2.34

Hb	Comparisons					
	SS versus AA			AS versus AA		
	OR	95% CI	*P*	OR	95% CI	*P*
≤8 g% versus>8 g	24.72	9.49–74.68	0.001	11.99	6.52–22.30	0.001

AS versus AA OR=11.98, 95% CI 6.52–22.30, *P*=0.0001. SS versus AA (Hb>8 vs. ≤8) OR=24.72, 95% CI 9.49–74.68, *P*=0.0001 (risk of SCD is almost 25 times more among subjects with Hb≤8 g% as compared to those with>8 g%. Hb: Hemoglobin

Table 2: The maternal complications during pregnancy and postpartum in SS, AS, and AA group

Variables	Complications risk comparisons					
	SS versus AA			AS versus AA		
	OR	95% CI	*P*	OR	95% CI	*P*
Hemoglobin						
Hb ≤8 g%	24.72	9.49–74.68	0.001	11.99	6.52–22.30	0.001
Hb >8 g%						
Miscarriage						
Yes	1.82	0.41–8.20	0.3066	0.84	0.20–2.79	0.7689
No						
Preterm labor						
Yes	2.14	0.48–7.52	0.1975	3.3	1.29–8.37	0.0036
No						
Congestive cardiac failure						
Yes	42.5	4.84–1961.6	0.0001	6.07	0.31–359.5	0.0959
No						
ARDS						
Yes	0	NA	0.0005	0	NA	NA
No						
UTI						
Yes	1.82	0.41–6.20	0.3066	2.8	1.13–6.83	0.0102
No						
Preeclampsia/eclampsia						
Yes	6.11	2.74–13.34	0.0001	1.45	0.65–3.09	0.302
No						
PPH/DIC						
Yes	3.39	0.7–10.46	0.0155	0.48	0.05–2.25	0.3389
No						
Pulmonary embolism						
Yes	0	NA	0.0005	0	NA	NA
No						
AVN femur						
Yes	0	NA	0.0134	0	NA	NA
No						
Maternal death						
Yes	0	NA	0.0005	0	NA	NA
No						
Crisis						
Yes	0	NA	0.0001	0	NA	0.0144
No						

Table 3: The mode of delivery in SS, AS, and AA group. Mode of delivery (excluding miscarriages)

Normal	SS versus AA			AS versus AA		
Yes	0.81	0.38–1.81	0.5737	83.96	35.88–200.0	0.0001
No						
Instrumental						
Yes	2.63	0.24–16.76	0.2406	0.66	0.12–2.44	0.5139
No						
LSCS						
Yes	1.07	0.46–2.34	0.8601	0.36	0.16–0.73	0.0028
No						

complications are also common. Risks of maternal mortality are increased. Fetal wastage is also common and more than one-third of pregnancies in a woman with sickle cell syndrome terminate in abortion, stillbirth, or early neonatal death.[3] LBW babies were born to SS mothers due to premature deliveries and fetal growth retardation.[4] Perinatal mortality is also very high.[4]

Among the complications during pregnancy, crisis was more significantly associated with the SS group as compared to that in the AS group (*P* value of SS-0.001; AS-0.014). Crisis as a complication during pregnancy is reported to be 48.6% by Dare *et al*.,[3] 56% by El-Shafei *et al*.,[4] 28% by Chhabra *et al*.,[5] 88% Leborgne-Samuel *et al*.,[6] and 41.4% by Odum *et al*.[7]

Table 4: Perinatal outcome in SS, AS, and AA group (As there were four miscarriages, the data are different)

Live birth						
Yes	0.14	0.03–0.55	0.0002	0.67	0.14–4.24	0.5744
No						
IUD						
Yes	4.97	0.69–30.47	0.0246	1.45	0.13–10.32	0.6696
No						
Stillbirth						
Yes	10.29	1.12–125.29	0.0022	1.48	0.25–28.77	0.7481
No						
Early neonatal death						
Yes	4.63	0.91–20.51	0.013	0.98	0.09–5.64	0.9838
No						
Low birth weight						
<2500 g	6.12	2.74–13.53	0.0001	2,24	1.15–4.82	0.0082
≥2500 g						
Birth weight						
<1500 g						
Yes	2.5	0.75–7.26	0.0649	0.73	0.17–2.36	0.5846
No						
1501–2000 g						
Yes	12.4	4.21–37.47	0.0001	5.03	1.80–14.66	0.0002
No						
2001–2500 g						
Yes	0.6	0.01–4.43	0.627	1.84	0.53–5.80	0.2434
No						
>2500 g						
Yes	0.19	0.09–40.33	0.0001	0.44	0.23–0.86	0.0077
No						

Preeclampsia was more in the SS group as compared to that in the AA group (42.85% vs. 15.11%, $P = 0.0001$). Preeclampsia among women with SCD was observed to be 2.4% by Idrisa *et al*.,[8] 16.2% by Dare *et al*.,[3] and 12.62% by Deshmukh *et al*.[9]

The risk of hemoglobin level <8 g/dL was significantly more, i.e., is 25 times more in the SS group ($P = 0.001$) and 12 times in the AS group (0.001) as compared to AA group.

The incidence of preterm labor was twice in SCD when compared to the control group. In women with SCD, preterm deliveries are reported to be 21.6% by Dare *et al*.,[3] 20% by Chhabra *et al*.,[5] 23% by Howard *et al*.,[10] and 21% by Leborgne-Samuel *et al*.[6]

Majority of cesarean sections in all the three groups were due to fetal distress, followed by CPD in our study, cesarean section was required in 12 of 38 (31.57%) in the SS group, 11 of 82 (13.41%) in the AS group, and 73 of 242 (30.16%) in the AA group. The cesarean section rate is reported to be 14.6% by Idrisa *et al*.,[8] 29.7% by Dare *et al*.,[3] 12% by El-Shafei *et al*.,[4] 66.66% by Howard *et al*.,[10] 48% by Leborgne-Samuel *et al*.,[6] and 43.2% by Odum *et al*.[7]

Dare *et al*.[3] reported that among the 29.7% cesarean sections, indications for cesarean section were CPD in 45.5%, fetal distress associated with intrauterine growth restriction in 18.1%, and transverse lie, severe preeclampsia with failed induction of labor and placenta previa in 9% each. Indications reported by El-Shafei *et al*.[4] were fetal distress in 67%, CPD in 10%, previous cesarean section in 10%, and miscellaneous in 13% (overall incidence 12%).

When compared to the control group, there was a higher risk of adverse fetal outcomes. Seven *et al*.[11] reported that there was no significant difference in pregnancy outcome among SCD and the control group in terms of perinatal mortality.

There were two maternal deaths in our study among the SS group (4.76% $P = 0.0005$) due to the consequences of severe anemia, following crisis and one had acute respiratory distress syndrome. There was no maternal death among the AS group and control (AA) group.

Thus, the risk of congestive cardiac failure is alarmingly high, i.e., 42 times more risk in ($P = 0.0001$) women with SCD. A high incidence of LBW babies was due to fetal hypoxia throughout the pregnancy caused by anemia and fetoplacental insufficiency.

Specialized antenatal care provided by a multidisciplinary team and should include (according to RCOG)[12]

- Folic acid administration 5 mg once daily preconceptionally and throughout the pregnancy
- Medical review by hematologist and screening of end-organ damage
- Avoid precipitating factors for crisis such as dehydration, exposure to extreme temperatures
- Thromboprophylaxis by LMW heparin and aspirin prophylaxis as recommended by RCOG and NICE guidelines
- Blood pressure and urine analysis at each visit
- Fetal growth monitoring by regular scans at every 4 weeks
- Top-up transfusion indicated for women with acute anemia, i.e., Hb under 6 g/dl or a fall of over 2 g/dl
- Exchange transfusion for acute chest syndrome is indicated with early recognition and antibiotic administration being the key for management
- Painful crisis the most frequent complication of SCD should be managed by strict monitoring of vitals, analgesia in form of opioids, and thromboprophylaxis
- Post-delivery care and vigilance for the prevention of complications.

Education and counseling of women with SCD and their partners contemplating pregnancy and during pregnancy are needed alongside a comprehensive screening of SCD. Guidelines are needed for all health-care professionals. For a multidisciplinary approach, referral centers should be well equipped with supplies of blood, ventilators, ability to screen, and treat complications with all intensive care facilities.

CONCLUSION

Incidence of preeclampsia ($P = 0.0001$) and congestive cardiac failure ($P = 0.0001$) was significantly high among women with SCD.

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Original Article

A Clinical Study on Post-operative Outcome in Perforation Peritonitis Patients with Reference to the History of Nonsteroidal Anti-inflammatory Drugs Use

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Abstract

Background: Perforation peritonitis is a commonly encountered surgical emergency and it is defined as inflammation of the serosal membrane that lines the abdominal cavity and the visceral organs. The objective of this study is to predict a correlation between post-operative outcomes in perforation peritonitis patients with reference to the history of nonsteroidal anti-inflammatory drugs (NSAIDs) use.

Materials and Methods: A total of 209 cases were studied with hollow viscous perforation peritonitis admitted in the surgical wards in Sanjay Gandhi Memorial Hospital associated with S. S. Medical College, Rewa (M.P.), India, in the period from June 1, 2018, to May 31, 2019. All necessary investigations were carried out. X-ray, ultrasonography abdomen, and blood investigations were done. Patient underwent emergency exploratory laparotomy and a careful record of pre-operative and post-operative findings was made and was carefully filled in the pro forma. All the patients were advised to attend surgical OPD for follow-up.

Results: Most of the patients (73.2%) of perforation peritonitis had a history of NSAID intake, out of which 81.6% recovered from the disease while mortality rate in perforation peritonitis associated with NSAID use was found to be 18.4%. Those patients with no history of NSAID use (26.8%) had a mortality rate of 9% while 91% of patients of perforation peritonitis were recovered from the disease.

Conclusion: In this study, it is concluded that the outcome of the patients of the perforation peritonitis is not dependent on the history of NSAIDs use, but NSAIDs abuse is one of the etiological factors in the pathogenesis of the perforation peritonitis.

Key words: Cyclo-oxygenase, Non streroidal anti inflammatory drugs, Prostaglandins

INTRODUCTION

Gastrointestinal perforation is a common abdominal emergency faced by general surgeon. A high index of suspicion is essential to diagnose visceral perforation early, as significant morbidity and mortality results from diagnostic delay.[1] Nonsteroidal anti-inflammatory drugs (NSAIDs) are very effective anti-inflammatory and analgesic agents and are among the most commonly used classes of medications worldwide but are very commonly associated with the etiopathogenesis of perforation peritonitis. Mechanism of action of NSAIDs has been explained on the basis of their inhibition of the enzymes that synthesize prostaglandins. However, it is clear that NSAIDs exert their analgesic effect not only through peripheral inhibition of prostaglandin synthesis but also through a variety of other peripheral and central mechanisms. It is now known that there are two structurally distinct forms of the cyclooxygenase enzyme

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(COX-1 and COX-2). COX-1 is a constitutive member of normal cells and COX-2 is induced in inflammatory cells. Inhibition of COX-2 activity represents the most likely mechanism of action for NSAID-mediated analgesia, while the ratio of inhibition of COX-1 to COX-2 by NSAIDs should determine the likelihood of adverse effects. In addition, some NSAIDs inhibit the lipoxygenase pathway, which may result in the production of algogenic metabolites. Reduction in the prostaglandins synthesis by inhibition of the COX-1 and COX-2 enzymes by the use of NSAIDs reduces the mucous production by the gastric mucosal glands and hence reduces the thickness of the protective mucosal barrier which causes perforation if the irritant persists.

Omitting the use of NSAIDs, time of presentation to the hospital, early surgical intervention, and post-operative care are important factors in determining the outcome of perforation peritonitis.

Aims and Objectives

A clinical study on postoperative outcome in perforation peritonitis patients with reference to the history of Nonsteroidal Anti-inflammatory Drugs abuse.

MATERIALS AND METHODS

The proposed study entitled "A Clinical Study on post-operative outcome in perforation peritonitis patients with reference to the history of NSAIDs use" was carried out on 209 patients admitted in surgical wards in the Department of Surgery, Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa, during the period of June 1, 2018, to May 31, 2019.

Inclusion Criteria

All cases of perforation peritonitis admitted in the Surgery Department of Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa, and have consented for participation in the study.

Exclusion Criteria

The following criteria were excluded from the study:

1. Patients left hospital during the course of treatment
2. Patients operated outside the institution
3. Patients with traumatic perforation peritonitis
4. Patients under 13 years of age due to different physiological status
5. Post-operative peritonitis
6. All pregnant females.

Sample Size

The sample size was 209 non-traumatic perforation peritonitis patients.

Methodology

All patients were admitted in the surgical ward of Sanjay Gandhi Memorial Hospital, Rewa, for the treatment of abdominal pain due to perforation peritonitis from June 1, 2018, to May 31, 2019.

Brief history was recorded such as duration of abdominal pain, nature of pain, relieved by medication, or by change in any posture, whether associated with fever or not, associated with any comorbid conditions, any drug abuse, use of alcohol or tobacco, corticosteroids or immunosuppressants for long time, and a detailed history regarding the use of NSAIDs were recorded. After confirming the diagnosis of perforation peritonitis, patients were resuscitated and underwent exploratory laparotomy and the results were concluded. Clinical examination included complete general examination of the patient along with per abdomen examination.

The general examination was usually performed in the supine position in adequate light and with proper exposure of the patient. Per abdomen examination was done in supine position with knee flexed in adequate light and proper exposure of the patient.

Most of the patients of perforation peritonitis had abdominal pain which was constant and severe. On general

Table 1: Outcome of perforation peritonitis patients in relation to NSAIDs use

Number of patients	Total (*n*)	Recovered		Death	
		n	%	*n*	%
History of NSAID taking	153	125	81.6	28	18.4
No history of NSAID taking	56	51	91	5	9
Total	209	176	84.2	33	15.8

NSAIDs: Nonsteroidal anti-inflammatory drugs

Table 2: Recovery of perforation peritonitis patients with relation to NSAIDs use

Patients recovered (Males/Females)	History of NSAID use (*n*)	No history of NSAID use (*n*)
Recovered males	106	46
Recovered females	19	5
Total	125	51

NSAIDs: Nonsteroidal anti-inflammatory drugs

Table 3: Mortality in perforation peritonitis patients with relation to NSAIDs use

Number of deaths (Male/Female)	History of NSAID use (*n*)	No history of NSAID use (*n*)
Death in males	20	5
Death in females	8	0
Total	28	5

NSAIDs: Nonsteroidal anti-inflammatory drugs

examination, most of the patients were having tachycardia, hypotension, tachypnea, and inability to pass flatus and feces. On per abdomen examination, most of the patients had distended abdomen with diffuse tenderness along with diffuse guarding and board-like rigidity. On percussion, obliteration of liver dullness was found in most of the patients. On auscultation of the abdomen, bowel sounds were often found sluggish or absent. Tenderness was present on per rectal examination.

The presence of free gas under diaphragm in X-ray abdomen in standing position was mainstay for the diagnosis of perforation peritonitis. For the diagnosis of perforation peritonitis, X-ray abdomen has a sensitivity of 84.62% and specificity of 97.30%.

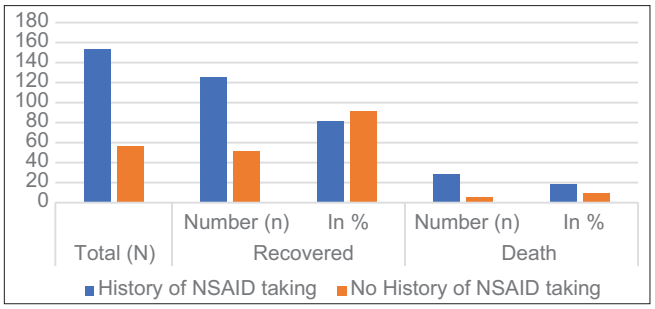
Ultrasonography, although, is not a primary modality for evaluating pneumoperitoneum, free gas can be detected on ultrasound when gas shadowing is present along the peritoneum. Ultrasonography has a sensitivity of 76.92% and specificity of 97.30% for the diagnosis of perforation peritonitis.

Computed tomography became an important tool in the detection and characterization of acute abdominal involvement in perforation peritonitis. Computed tomography imaging is often the initial modality in acute abdomen in a significant proportion of patients, and radiologists should have a high level of suspicion in detection and interpretation of peritoneal abnormalities. Contrast-enhanced computed tomography has 100% specificity and sensitivity for the diagnosis of perforation peritonitis.

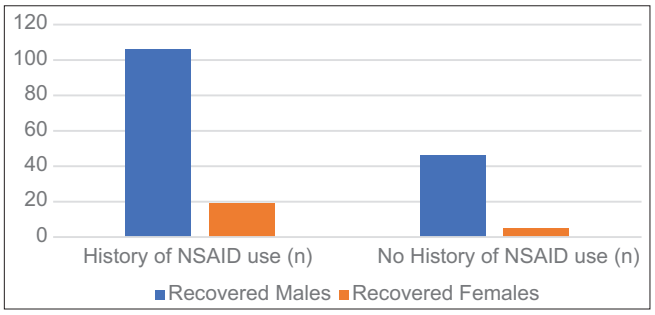
Laboratory investigations were carried out as per clinical relevance, including complete blood count, random blood sugar, serum electrolytes, renal function tests, liver function tests, blood grouping and typing, and Widal test. Thus, we observe the per abdomen clinical findings and presence of free gas under diaphragm in X-ray abdomen in standing position and results were calculated and tabulated accordingly.

OBSERVATION AND RESULTS

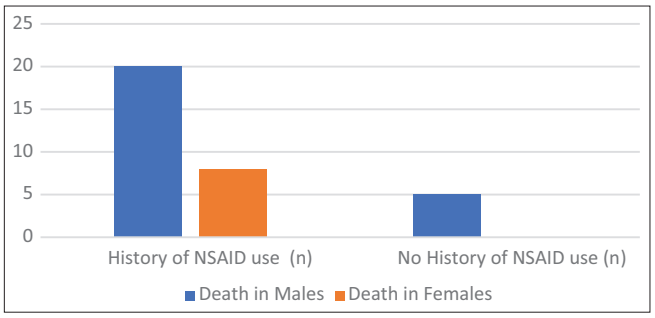
It is evident from the above data that most of the patients (73.2%) of perforation peritonitis had a history of NSAID taking [Table 1 and Graph 1], out of which 81.6% recovered from the disease [Table 2 and Graph 2] while mortality rate in perforation peritonitis associated with NSAID taking was found to be 18.4% [Table 3 and Graph 3]. Those patients with no history of NSAID taking (26.8%) had a mortality rate of 9% while 91% recovered from the disease. $P > 0.05$ is statistically insignificant which shows that after having perforation peritonitis, outcome of the patient is not dependent on history of taking NSAID.



Graph 1: Correlation between outcomes of patients with nonsteroidal anti-inflammatory drug taking



Graph 2: Recovery of perforation peritonitis patients with relation to nonsteroidal anti-inflammatory drugs use



Graph 3: Mortality in perforation peritonitis patients with relation to nonsteroidal anti-inflammatory drugs use

DISCUSSION

NSAIDs can cause damage to the gastroduodenal mucosa through several mechanisms, including the topical irritant effect of these drugs on the epithelium, impairment of the barrier properties of the mucosa, suppression of gastric prostaglandin synthesis, reduction of gastric mucosal blood flow, and interference with the repair of superficial injury. The presence of acid in the lumen of the stomach also contributes to the pathogenesis of NSAID-induced ulcers and bleeding, by impairing the restitution process, interfering with hemostasis, and inactivating several growth factors that are important in mucosal defense and repair. In the present study, it was found that 73.2% of the patients of perforation peritonitis had a history of NSAID use, out of which 81.6% recovered from the disease while mortality rate in perforation peritonitis associated with NSAID

taking was found to be 18.4%. Those patients with no history of NSAID taking (26.8%) had a mortality rate of 9% while 91% recovered from the disease. A similar study conducted by Amit *et al.*, in 2016,[2] conducted a study and concluded that 76.9% of patients of gastric perforation peritonitis had a positive history of chronic NSAID use. The study conducted by Mukherjee *et al.*, in 2016,[3] and found that 42% of patients were chronic NSAIDs user. In 2013, a study conducted by Chakma *et al.*[4] on spectrum of perforation peritonitis and found that 36.84% of patients gave a positive history for chronic NSAID use in cases of duodenal perforation peritonitis. Mewara *et al.*, in 2017,[5] conducted a similar study and concluded that 79% of patients were having the history of using NSAIDs within 15 days of perforation or before.

A study conducted by Mukherjee *et al.*, in 2016,[3] on perforation peritonitis and concluded that the most common site of perforation was the duodenum, the cause being acid peptic disease as a consequence of NSAIDs use. In the present study, 82.6% of patients who were taking NSAIDs recovered from the disease after exploratory laparotomy while 92% of patients who were not taking NSAIDs recovered from the disease after exploratory laparotomy. A similar study done by Abdulhameed *et al.*, in 2017,[6] on pre-operative findings and outcome of perforation peritonitis and concluded that associated factors such as smoking, alcoholism, acid peptic disease, and NSAID use increase mortality. In the present study, those patients with no history of NSAID taking (26.8%) had a mortality rate of 8%. $P > 0.05$ is statistically insignificant which shows that after having perforation peritonitis, outcome of the patient is not dependent on history of taking NSAID.

CONCLUSION

We had the study of 209 cases of perforation peritonitis in the Shyam Shah Medical College and Sanjay Gandhi Hospital, Rewa, the Vindhya region in the Madhya Pradesh. The educational status of this territory is below average, and the peoples are very unaware of their health. Most of the people do hard work for their wages and for their tiredness they are abusing the painkillers with their empty stomach. Out of 209 cases, 153 patients have a history of using painkillers within 15 days of perforation for any reason, out of which 125 patients recovered from the disease after exploratory laparotomy while 28 patients could not survive. After analyzing the data obtained from the study, it is concluded that the NSAIDs have an etiological role in the perforation peritonitis, but it does not affect the outcome of the diseased after exploratory laparotomy.

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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Original Article

Cardiovascular Profile of Rheumatoid Arthritis Patients and its Correlation with Disease Activity

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Abstract

Introduction: Rheumatoid arthritis (RA) is a chronic inflammatory disorder, involving joints and extra-articular manifestations. About 50% mortality in RA is due to cardiovascular disease. Cardiovascular events occur approximately a decade earlier in RA like that in diabetes mellitus.

Aim: The aim of the study was to correlate and compare the association between disease severity and various clinical and cardiovascular manifestations in RA patients.

Materials and Methods: This prospective cross-sectional study is carried out in known RA patients fulfilling the American College of Rheumatology criteria 2010 attending General Medicine and Rheumatology outpatient clinic of Tirunelveli Medical College Hospital between April 2017 and April 2018. They have been subjected to detail clinical and laboratory investigations and their cardiovascular manifestations are compared with their clinical profile and disease activity score.

Results: In this study, 50 patients were included, with a mean age of 47.76 years and 72% of female patients. The mean clinical disease activity index (CDAI) score among them is 25.16 ± 10.4. The disease severity was high among our study group with 60% of cases occupying high CDAI score with no patients under remission. The most common electrocardiogram abnormality found in the study group was left axis deviation (30%) followed by nonspecific ST-T changes (24%). Mean carotid intima-media thickness (CIMT) was found to be increased in 68% of patients. Asymptomatic carotid plaque was present in 8% of patients. The most common echocardiographic abnormality is left ventricular (LV) diastolic dysfunction, which contributes 44% in our study group.

Conclusion: Cardiovascular abnormalities such as LV diastolic and systolic dysfunction, premature atherosclerosis occur commonly in RA patients and positively correlate with CDAI score, disease duration, and treatment duration. All RA patients should be screened for chorionic villus sampling abnormalities through echocardiography and CIMT periodically.

Key words: Cardiovascular disease, Cardiovascular risk, Rheumatoid arthritis

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory disorder characterized by both articular and extra-articular manifestations. The chronic subclinical inflammation in RA contributes to accelerated atherosclerosis and various cardiovascular events.[1] A recent study showed that 50% mortality in RA is due to cardiovascular disease-related deaths. RA is associated with disability, shortened life expectancy, and increased mortality as compared to the general population.[2] Cardiovascular events seem to occur approximately a decade earlier in RA patients like that in diabetes mellitus (DM).[3] Moreover, such as DM and dyslipidemia, there is an independent association of RA with preclinical and overt cardiovascular disease and most of the time, it is silent with unfavorable outcome leading to premature death.[4,5] In a study, if the clinical disease activity index (CDAI) score falls by 10, the risk of developing cardiovascular disease decreased by 26% has been formulated.[6] Hence, it is necessary to do screening for cardiovascular disease in all RA patients. Furthermore, the influence of disease activity on the development of cardiovascular disease should also be studied.

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Aim

The aim of the study was to correlate and compare the association between disease severity and various clinical and cardiovascular manifestations in RA patients.

MATERIALS AND METHODS

This prospective cross-sectional study is carried out in known RA patients attending the General Medicine and Rheumatology outpatient clinic or ward of Tirunelveli Medical College Hospital between April 2017 and April 2018. They have been selected after detailed investigations and found to be fulfilling the American College of Rheumatology (ACR) criteria for RA 2010 and also the inclusion and exclusion criteria of our case study.

Inclusion Criteria

The following criteria were included in the study:

1. Patients more than 16 years of age
2. Known RA patients who have been clinically examined and investigated and found to be fulfilling the ACR criteria for RA 2010.

Exclusion Criteria

The following criteria were excluded from the study:

1. RA patients with known overt cardiovascular disease such as coronary artery disease, cerebrovascular disease, and peripheral vascular disease
2. RA patients with other independent risk factors for developing cardiovascular diseases such as diabetes, hypertension, smoking, and alcoholism
3. Patients <16 years of age
4. Patients not fulfilling the ACR criteria for RA in 2010
5. RA patients not willing to participate in the study.

Written informed consent was obtained from the patients selected for the study. They have been subjected to detail clinical and laboratory investigations. Routine investigations such as complete blood count, hemoglobin, total leukocyte count, differential count, platelet count, renal function test, liver function test, serum electrolytes, fasting lipid profile, urine routine investigations, and blood sugar. In addition, investigations such as erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), RA factor, anti-cyclic citrullinated peptide antibody, electrocardiogram (ECG), chest X-ray posteroanterior view, echocardiogram, and carotid Doppler to detect carotid intima-media thickness (CIMT) were done for all patients.

Clinical disease severity index (CDAI) score was calculated for all selected patients in the study, which denotes the disease severity and activity in the patient. It was calculated using the formula,

$$CDAI = SJC(28) + TJC(28) + PGA + EGA.$$

Whereas

- SJC denotes swollen joint count (28)
- TJC denoted tender joint count (28)
- PGA denotes patient global disease activity scale and
- EGA denotes evaluator's global disease activity scale, latter two ranging from 1 to 10.

RESULTS

Our study group consists of 50 RA patients who fell in the age group of 21–74 years with a mean age of 47.76 years. Males among the study group occupy 28% and females 72%, respectively. The mean duration of RA among the study population is 8.63 ± 5.85 years. The disease severity among patients was assessed with clinical disease severity score and the mean CDAI score among them is 25.16 ± 10.4. The disease severity was high among our study group with 60% of cases occupying a high CDAI score with no patients under remission. Metacarpophalangeal, proximal interphalangeal joint, and wrist joints are the most commonly involved joints among the study population [Figures 1 and 2]. Anemia seems to occur more commonly in RA patients, being in 72% of our study population. Lymphocytosis was found in 20% of our study group. Thrombocytopenia

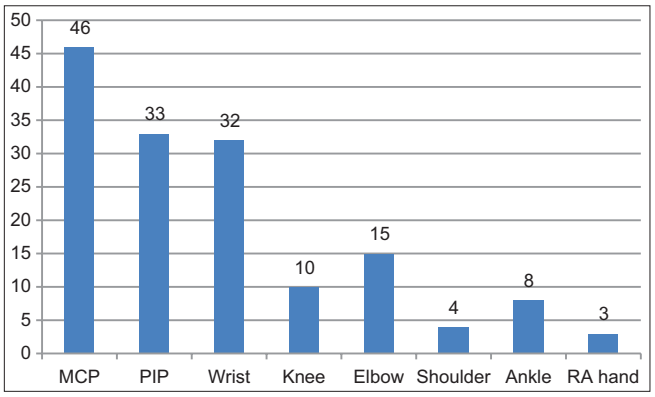

Figure 1: Distribution of joint involvement

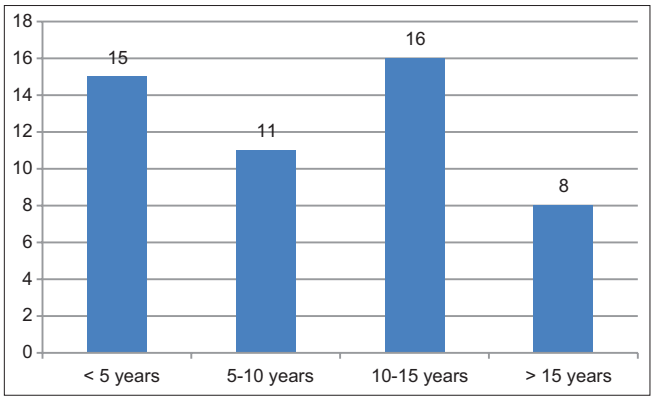

Figure 2: Distribution of disease duration

and thrombocytosis occur in minority groups of patients (14% and 4%, respectively). Dyslipidemia in the form of hypercholesterolemia and hypertriglyceridemia was found in 10% and 4% of our study population, respectively. Markers of inflammation such as ESR and CRP are raised more commonly among RA patients, ESR being more commonly raised in 96% of patients, and CRP raised in 46% of patients in the study group [Figures 3 and 4].

The disease severity was high among our study group with 60% of cases occupying a high CDAI score with no patients under remission.

Mean CIMT of the study population was correlated with various parameters such as age of patient, duration of disease, duration of treatment, ESR, and CDAI score.

There is a significant relationship between the mean CIMT and the CDAI score ($P = 0.043$).

There is a significant relationship between the mean CIMT and duration of RA, duration of treatment ($P = 0.015$ and 0.010, respectively). There is no significant relationship between mean CIMT and age of the patient and ESR values ($P = 0.347$ and 0.732, respectively).

There is no significant relationship between mean CIMT and CRP levels.

There is a significant relationship between variation in ejection fraction and CDAI score ($P = 0.030$). There is a strong correlation between left ventricular systolic dysfunction (LVSD) and clinical disease severity index score ($P < 0.0001$). There is no significant relationship between left ventricular (LV) diastolic dysfunction and CDAI score ($P = 0.196$). There is a significant relationship between the occurrence of pericardial effusion and clinical disease severity index score ($P = 0.007$). There is no significant relationship between the occurrence of pulmonary hypertension and the clinical disease severity index score ($P = 0.975$). There is no significant relationship between the occurrence of mitral regurgitation and the clinical disease severity index score ($P = 0.080$). There is no significant relationship between the occurrence of aortic sclerosis and clinical disease severity index score

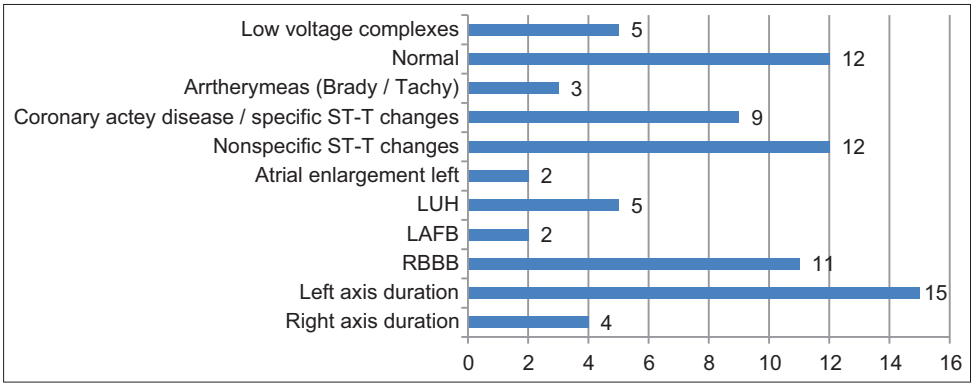

Figure 3: Electrocardiogram changes in the study group

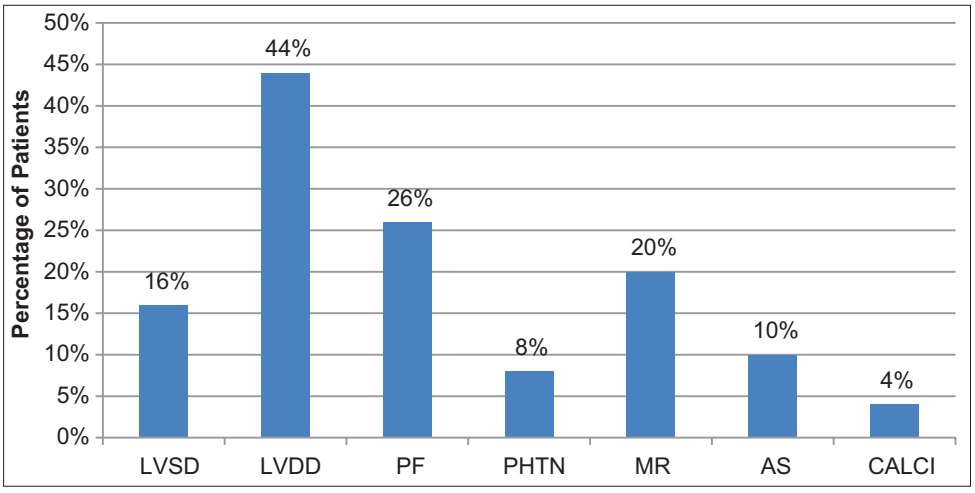

Figure 4: Distribution of echo cardiographic

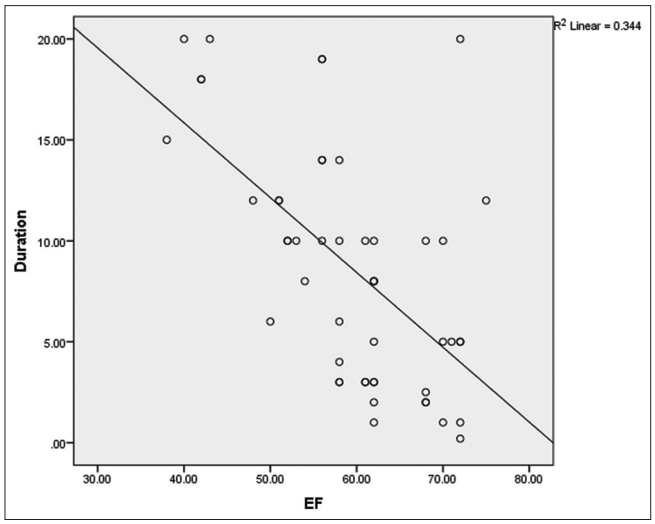

Figure 5: Correlation of duration of disease with ejection fraction

($P = 0.165$). There is no significant relationship between the occurrence of coronary calcifications and clinical disease severity index score ($P = 0.507$).

There is a strong significant relationship between variation in ejection fraction and duration of RA ($P < 0.0001$) [Figure 5].

There is a strong significant relationship between LVSD and the duration of RA ($P = 0.003$). There is a strong significant relationship between LVSD and the duration of RA ($P = 0.003$). There is no significant relationship between the occurrence of pericardial effusion and the duration of RA ($P = 0.707$). There is no significant relationship between the occurrence of pulmonary hypertension and the duration of RA ($P = 0.246$). There is a significant relationship between the occurrence of mitral regurgitation and the duration of RA ($P = 0.016$). There is a significant relationship between the occurrence of aortic sclerosis and the duration of RA ($P = 0.038$). There is no significant relationship between the occurrence of coronary calcifications and the duration of RA ($P = 0.890$).

DISCUSSION

Most common ECG abnormality found in the study group was left axis deviation (30%) followed by nonspecific ST-T changes (24%). ST-T changes suggestive of coronary artery disease in asymptomatic patients of our study group was found in 18% of individuals, which was comparable to Shenavar Masooleh *et al.*,[7] in which 15% cases had ST-T changes. In chest X-ray screening, cardiomegaly was found in 40% of patients and other abnormalities such as fibrotic changes in lungs, prosthetic heart valve shadows, and bronchiectasis changes in lungs were present in a minority of patients. Mean CIMT (cutoff among normal individuals is 0.57 mm) is increased in RA patients when matched with age-related controls, which signifies the presence of premature atherosclerosis. In our case series, mean CIMT was found to be increased in 68% of patients. Asymptomatic carotid plaque was present in 8% of patients. The presence of carotid plaque suggests that the patients are in the stage of preclinical atherosclerosis and emphasize the need for more aggressive risk reduction strategies in these patients. The most common echocardiographic abnormality is LV diastolic dysfunction, which contributes 44% of the study group, comparable to 14.54% in study conducted by Raof[8] followed by pericardial effusion contributing to 26%, which was comparable to the study conducted by Coskun *et al.*,[9] in which it was 15%. A high prevalence of this complication (47%) was found in the study done by Shenavar Masooleh *et al.*[7] Other abnormalities such as mitral regurgitation, LVSD was present in 20% and 16% of the study population, respectively, whereas it was as high as 31% (LVSD) in the study by Dawson *et al.*[10] Coronary calcifications were found in two patients. ESR correlates positively with CDAI score, duration of RA, and mean CIMT. This proves that increased CIMT was associated with an inflammatory burden due to more severe disease, and also the chronic inflammation, which reflects the duration of the disease. Dyslipidemia and CRP show no significant correlation with CIMT or other chorionic villus sampling (CVS) abnormalities, as compared to the results by Mahajan *et al.*[11] who did not find significantly correlated dyslipidemia with accelerated atherosclerosis in RA patients. According to Homma *et al.*[12] CIMT increases linearly from 0.48 mm at 40 years of age to 1.02 mm at 100 years of age. Mean age group in our study was 47.76 years and mean CIMT was 0.72 mm; hence, in our study group, CIMT was higher than age-related controls and correlates positively with the severity of disease as evidenced by high CDAI score ($P = 0.043$) and duration of disease ($P = 0.015$), similar observation made by Gonzalez *et al.* and Alkaabi *et al.*[1] in their respective studies. In an Indian study, Mahajan *et al.*[11] also showed similar observations that showed higher CIMT values in RA patients when compared to a control group matched age and related parameters. Among echocardiographic findings, LVSD, variation in ejection fraction, and pericardial effusion positively correlate with clinical disease severity index (CDAI) score in our study group. Left ventricular systolic function, left ventricular diastolic dysfunction, and valvular abnormalities such as mitral regurgitation and aortic sclerosis correlate positively with the duration of RA. Coronary calcification was found in 4% of patients in our study, was an indirect marker of subclinical atherosclerosis, and serves as a marker of cardiovascular events. In our case series, coronary calcification has no significant association with disease severity and duration of disease, in contrast to the study by Giles *et al.*, which shows increasing disease

severity in RA, is associated with increased prevalence and extent of coronary calcification, irrespective of gender and age.

CONCLUSION

Cardiovascular abnormalities such as non-atherosclerotic features such as LV diastolic and systolic dysfunction, valvular abnormalities, pericardial effusion, and mainly premature atherosclerosis occur commonly in RA patients and their occurrence positively correlates with CDAI score, disease duration, and treatment duration. All RA patients should be screened for CVS abnormalities through modalities such as electrocardiography, echocardiography, and CIMT periodically.

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Original Article

Profile of Congenital Heart Disease in Children with Down's Syndrome Attending an Early Intervention Center in a Teaching Hospital in South India

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Abstract

Background: Down's syndrome is the most common chromosomal disorder and the association between Down's syndrome and congenital heart disease (CHD) is well established. The spectrum of CHD in Down's syndrome shows wide variations due to genetic, socioeconomic, and geographic factors. The incidence of CHD in Down's syndrome is around 40–60% and contributes significantly to the morbidity and mortality in these children in the first 2 years of life.

Objective: The objective of the study was to study the incidence and spectrum of CHD in children with Down's syndrome attending special clinics.

Materials and Methods: It is a prospective, observational, and monocentric study done over a period of 3 years (2016–2019). Echocardiogram was done to all children at the first visit.

Results: Of the 120 children studied, 62 had CHD (52%) and ostium secundum atrial septal defect was the most common lesion (36%).

Conclusions: The incidence of CHD in Down's syndrome in this study is 52%. Hence early cardiac screening is of paramount significance in all children with Down's syndrome.

Key words: Atrial septal defect, Congenital heart disease, Down's syndrome

INTRODUCTION

The incidence of Down's syndrome caused by trisomy 21 is 1 in 733 live births and is characterized by intellectual disability, congenital anomalies, and characteristic dysmorphic facial features. In 95% of case, trisomy 21 is due to meiotic non-disjunction, 4% due to translocation, and 1% due to mosaicism. Around 4–10% of all congenital heart defects have association with Down's syndrome and 40–60% of patients with Down's syndrome have cardiac defects. Affected children are prone to congenital heart disease (CHD) such as atrioventricular septal defect (AVSD), ventricular septal defect (VSD), isolated secundum atrial septal defect (ASD), patent ductus arteriosus (PDA), and tetralogy of Fallot (TOF) and have increased risk of pulmonary hypertension. Considerable ethnic and geographic variations exist in the most common cardiac lesion seen in Down's syndrome and AVSD is the most frequently diagnosed CHD (30–40%) followed by ASD (25%) and VSD (22%).

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The American Academy of Pediatrics recommends cardiac screening of all newborn babies with Down's syndrome and early establishment of cardiac status by 6 weeks of age is recommended widely. Failure to recognize CHD early can result in irreversible pulmonary hypertension and early deaths in these children.

Aim of the Study

The aim of the study was to find the incidence of CHD and identify the pattern of CHD in Down's syndrome.

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MATERIALS AND METHODS

Study Centre

This study was conducted at District Early Intervention Centre (DEIC) of a teaching hospital in Tamil Nadu.

Sampling

Down's syndrome children from birth to 18 years with classical phenotypic features of flat facial profile, slanted palpebral fissures, epicanthal folds, brachycephaly, single palmar crease, clinodactyly, hyperflexible joints, and hypotonia referred from neonatal intensive care unit, Rashtriya Bal Swasthya Karyakram team, and pediatric outpatient department were enrolled in the study. Diagnosis of Down's syndrome was done on clinical grounds and karyotyping was done whenever feasible. This is a prospective and observational study conducted for a period of 3 years from 2016 to 2019.

Two-dimensional echocardiogram was done for all children in the first visit by experienced cardiologists. Data were analyzed using simple descriptive statistics.

RESULTS

A total of 120 children with Down's syndrome participated in the study with 56 male and 64 female children contributing to 46.3% and 53.7%, respectively. The male-to-female ratio of the sample was 1:1.1.

The age group of the study sample varied widely from the youngest one of age 4 days to the oldest of age 14 years. Infants contributed to the majority of Down's syndrome in this study (43.3%, n = 52) due to early referral from neonatal ICUs to DEIC for early intervention. Thirty-two (26.6%) were between 1 and 5 years, 22 (18.3%) between 5 and 10 years, and 14 (11.6%) above 10 years of age [Table 1 and Figure 1].

In our study, out of 120 children, 62 had CHD while 58 had normal cardiac status. The incidence of CHD in our study was 52%. Children <1 year of age contributed to the majority with CHD 50% (n = 31). The spectrum of CHD varied from isolated CHD in 73% (n = 45) to mixed lesions in 27% (n = 17) [Figure 2].

The most common isolated heart disease was ostium secundum ASD contributing to 36% (n = 22), followed by AVSD 8.2% (n = 5), PDA 8.2% (n = 5), VSD 5% (n = 3), TOF in 3.3% (n = 2), and pulmonary stenosis in 1.6% (n = 1). Patent foramen ovale was seen in 5 children (8.2%).

The most common associated lesion was PDA with ASD 11.5% (n = 8) followed by ASD with VSD in 9.8% (n = 6), VSD with PDA in 9.8% (n = 2), and ASD + VSD + PDA in 1.6% (n = 1) [Table 2 and Figure 3]. Three infants with CHD expired during the course of the study and 7 were lost to follow-up.

DISCUSSION

One hundred and twenty Down's syndrome children comprised the study population. The male-to-female ratio of the sample population was 1:1.1 and comparable to the male-to-female ratio in the study by Morsy *et al.*[1] and Benhaourech *et al.*[2] which was 1:1.

The study by Morsy *et al.*[1] had an incidence of 58.6% and a high incidence of 63.4% and 69.5% was found in studies by

Table 1: Age- and gender-wise distribution of children with Down's syndrome

Age group (years)	Male	Female	Percentage
<1	22	30	43.3
1–5	18	14	26.6
5–10	12	10	18.3
>10	4	10	11.6

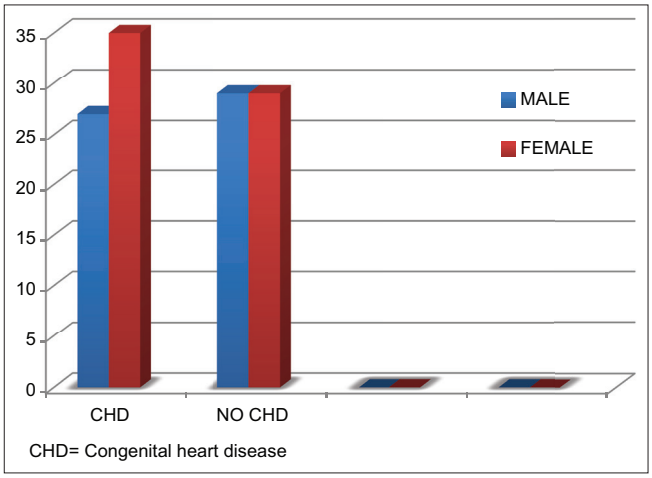

Figure 1: Gender distribution of Congenital heart disease

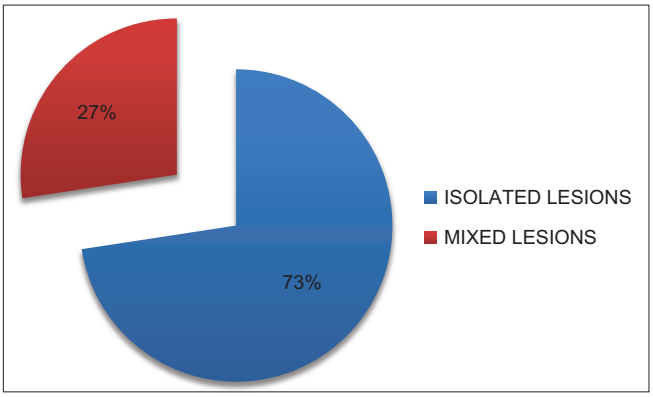

Figure 2: Spectrum of congenital heart disease

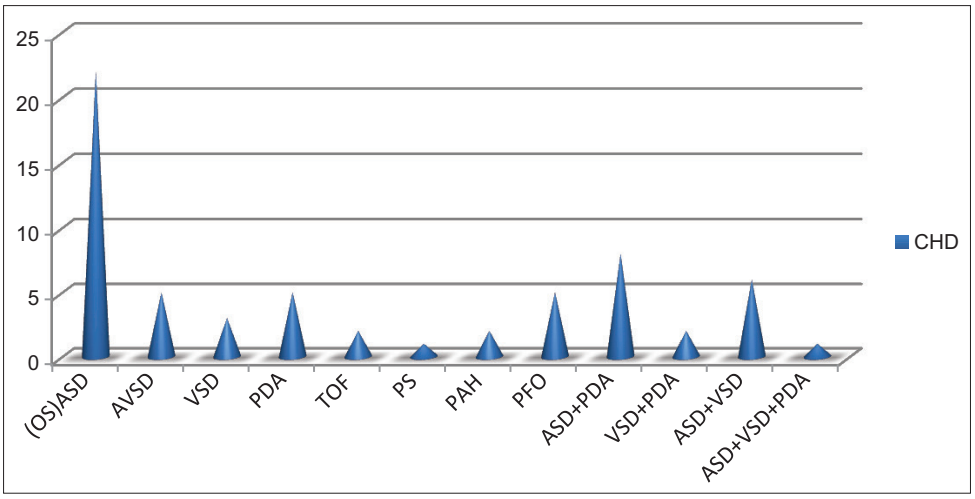

Figure 3: Pattern of CHD in Down's syndrome

Table 2: Spectrum of congenital heart disease in Down's syndrome

Cardiac lesion	Total (*n*=62)	Percentage
(OS) ASD	22	36
AVSD	5	8.2
VSD	3	5
PDA	5	8.2
TOF	2	3.3
PS	1	1.6
PAH	2	3.3
PFO	5	8.2
ASD+PDA	8	11.5
VSD+PDA	2	3.3
ASD+VSD	6	9.8
ASD+VSD+PDA	1	1.6

AVSD: Atrioventricular septal defect, VSD: Ventricular septal defect, ASD: Atrial septal defect, PDA: Patent ductus arteriosus, TOF: Tetralogy of Fallot, PS: Pulmonary stenosis, PAH: Pulmonary arterial hypertension, PFO: Patent foramen ovale

Table 3: Gender-wise distribution of CHD in Down's syndrome

CHD	Male (%)	Female (%)
Isolated CHD	20	25
Mixed CHD	7	10
Total	27 (44)	35 (56)

CHD: Congenital heart disease

Narayanan *et al.*[3] and Alsuhaibani *et al.*,[4] respectively. The result of our study (52%) correlated with the worldwide incidence of 40–60% CHD in Down's syndrome and was comparable to many other studies.

The incidence of CHD in male was 44% and the female Down's syndrome children outnumbered with 56% in our study. The meta-analysis by Diogenes *et al.*[5] observed that female gender is a risk factor for the presence of CHD in Down's syndrome and AVSD alone showed a higher frequency in female gender. The same result was found in the study by Mourato *et al.*[6] with a female preponderance of 56.1%. However, no gender difference was noted in the prevalence of CHD in the study by Morsy *et al.*[1] In another study from South India,[7] the incidence of CHD was more in male (55%) than female children [Table 3].

Isolated CHDs topped the list in our study with 73% while mixed lesions were found in 27%. In Nisli *et al.*[8] study, isolated lesions were found in 77.6% and mixed lesions in 22.4%. Shrestha and Shrestha[9] study had 65% isolated CHDs and 35% mixed lesions.

The most common isolated CHD in this study was ostium secundum ASD (36%). In studies by Alsuhaibani *et al.*[4] and Mourato *et al.*,[6] ostium secundum ASD was the most common lesion in 33.5% and 51.78%, respectively. In comparison, the most common isolated lesion was AVSD in Benhaourech *et al.*,[2] 85.2%, Narayanan *et al.*[3] showed 27.3%, and El-Attar[10] study showed 33.3%. Our study had AVSD in 8% probably due to ethnic variation and early deaths of these children. Many genetic studies also showed that AVSD had the most significant gender and ethnic differences.

The association of TOF in Down's syndrome is infrequent and accounts for 5–8% of all CHDs in trisomy 21. TOF was found in 3% in our study. El-Attar study had 2.2% TOF and Shrestha and Shrestha[9] study had 7.5% TOF.

The most common mixed lesion in this study was PDA with ASD (11.5%) followed by ASD with VSD (9.8%). The most common association in Sharifi *et al.*[11] study was ASD with VSD in 19.9% and VSD with PDA in 9%.

Pulmonary arterial hypertension (PAH) was found in 3.3% of cases in our study while higher incidence was found in many other studies. PAH was found in 53% in Benhaourech *et al.*[2] study and in 37.5% in Mourato *et al.*[6] study. The low

incidence in our study could be because infants form the major number in our study and further follow-up of these children will give the exact incidence of PAH.

CONCLUSIONS

CHD was found in 52% of children with Down's syndrome in our study. Hence, early diagnosis by early cardiac screening as recommended by the American Academy of Pediatrics and regular follow-up is the key for early surgical intervention to avoid irreversible hemodynamic consequences and mortality in these children.

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Original Article

Thyroid Profile of Patients with Non-alcoholic Fatty Liver Disease

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Abstract

Introduction: Non-alcoholic fatty liver disease (NAFLD) is associated with various metabolic abnormalities such as obesity, insulin resistance, and dyslipidemia. The prevalence of NAFLD is increasing gradually, which may progress to non-alcoholic steatohepatitis (NASH), cirrhosis of liver, and hepatocellular carcinoma. The important association of NAFLD and metabolic disease can lead to endocrinopathy, including thyroid diseases.

Methodology: Serologically diagnosed NAFLD patient was evaluated biochemically for liver function and thyroid function to evaluate any association between these two.

Results: The study shows female preponderance (63.3%) NAFLD. It was observed that 77.50% were having normal transaminase level and 22.50% had raised transaminase levels (NASH). Subclinical hypothyroidism was present among 18.30%, overt hypothyroidism was 7.50%, and hyperthyroidism was 0.80%. Among the individuals with normal transaminase level, 20.50% were hypothyroid (15.10% subclinical and 5.40% overt), and persons with raised transaminase levels (NASH), 44.44% were hypothyroid (29.63% subclinical and 14.81% overt).

Conclusion: This study shows that though there was a female preponderance of NAFLD, raised transaminase was more common among male and so is the hypothyroidism. This may form a matrix to the future study for cause and effect relationship of NAFLD and thyroid disease.

Key words: Hypothyroid, Non-alcoholic fatty liver disease, Subclinical hypothyroid, Transaminase

INTRODUCTION

Non-alcoholic fatty liver disease (NAFLD) is defined as the presence of fat in the liver (hepatic steatosis) either on imaging or on liver histology after the exclusion of secondary causes of fat accumulation in the liver, for example, significant alcohol consumption (defined as greater than 40 g/day)[1] or certain medications such as estrogen, antitubercular therapy (ATT), tamoxifen, methotrexate, and amiodarone.[2]

NAFLD represents one of the most common chronic disorders of the liver in the Western industrialized nations.[3-6] Its prevalence worldwide is estimated at 20–30%.[7-9] Recently, a gradual increase in NAFLD being observed in developing countries. It is presumed to be due to the adaptation of Western culture, sedentary lifestyle, and an increase in diagnostic modalities in developing countries.

The mechanism underlying the pathogenesis and progression of NAFLD is not entirely clear. The best-understood mechanisms pertain to hepatic steatosis. This is proven to result when hepatocyte mechanisms for triglyceride synthesis (e.g., degradative metabolism and lipoprotein export), leading to the accumulation of fat (i.e., triglyceride) within hepatocytes. Obesity stimulates hepatocyte triglyceride accumulation by altering the intestinal microbiota to enhance both energy harvest from dietary sources and intestinal permeability. Reduced intestinal barrier function increases hepatic exposure to gut-derived products, which stimulates liver cells to generate inflammatory mediators that inhibit insulin

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actions. Obese adipose depots also produce excessive soluble factors (adipokines) that inhibit tissue insulin sensitivity. Insulin resistance promotes hyperglycemia. This drives the pancreas to produce more insulin to maintain glucose homeostasis. However, hyperinsulinemia also promotes lipid uptake, fat synthesis, and fat storage. The net result is hepatic triglyceride accumulation (i.e., steatosis).[10]

NAFLD includes a variety of entities ranging from simple fatty liver or hepatic steatosis to non-alcoholic steatohepatitis (NASH) and cirrhosis of the liver[11-13] and is associated with the risk of malignant degeneration to hepatocellular carcinoma and the increased necessity of liver transplantation.[14,15] A central role in the development of NAFLD has been ascribed to the metabolic syndrome, whose main characteristics, such as obesity, insulin resistance, and/or type-2 diabetes mellitus and dyslipidemia, are closely associated with NAFLD.[11] Not surprisingly, there is also an association between NAFLD and cardiovascular disorders.[3,4]

Thyroid hormones are secreted from thyroid gland and regulated by hypothalamo–pituitary–adrenal axis. The hypothalamic–pituitary–thyroid axis (HPT axis for short, also known as thyroid homeostasis or thyrotropic feedback control) is part of the neuroendocrine system responsible for the regulation of metabolism. As its name suggests, it depends on the hypothalamus, the pituitary gland, and the thyroid gland. The hypothalamus senses low circulating levels of thyroid hormone (triiodothyronine [T3] and thyroxine [T4]) and responds by releasing thyrotropin-releasing hormone (TRH). The TRH stimulates the pituitary to produce thyroid-stimulating hormone.

The TSH, in turn, stimulates the thyroid to produce thyroid hormone until levels in the blood return to normal. Thyroid hormone exerts negative feedback control over the hypothalamus as well as anterior pituitary, thus controlling the release of both TRH from hypothalamus and TSH from anterior pituitary gland.[16]

Recently, a correlation between thyroid dysfunction, especially clinical or subclinical hypothyroidism, and NAFLD has been detected.[8,17-20] Hormones synthesized in the thyroid gland play an important role in the regulation of diverse metabolic processes. Disturbances in thyroid hormone concentrations may promote hyperlipidemia and obesity, thus contributing to NAFLD.[17,21] Early identification of at-risk patients is important since the treatment of the hypothyroidism may reduce the risk of NAFLD and potential complications.[22] Hence, this present study was planned to assess the thyroid dysfunction among the patients of NAFLD attending a tertiary care center of the Northeastern region of India.

Aim of the Study

The aim of the study was as follows:

1. To study the frequency of subclinical and overt hypothyroidism and hyperthyroidism among the patients with NAFLD
2. To study the association between transaminase level with thyroid hormone level.

METHODOLOGY

Study Population

Patients who were diagnosed to have NAFLD during the study duration of the year were included in the study.

Sample Size

Patients, who have undergone ultrasonography (USG) of whole abdomen examination in the radiology department for some or other reason and incidentally diagnosed to have fatty liver, have been screened by inclusion and exclusion criteria to diagnose NAFLD. All of such NAFLD patients, thyroid profile has been estimated. From the previous records, it is found that approximately 80 patients are diagnosed to have NAFLD in 1 year. Hence, in 1½ years, approximately the sample was considered to be 120.

Operational Definition

NAFLD

NAFLD is defined as the presence of fat in the liver (hepatic steatosis) either on imaging or on liver histology after the exclusion of secondary causes of fat accumulation in the liver, for example, significant alcohol consumption (defined as greater than 40 g/day)[1] or certain medications such as estrogen, ATT, tamoxifen, methotrexate, and amiodarone.[2]

NASH

When NAFLD is associated with raised transaminase levels, the diagnosis of NASH is made[10] (normal aspartate aminotransferase 12–38 U/L and alanine aminotransferase 7–41 U/L).[23]

Hypothyroidism

The diagnosis of subclinical hypothyroidism was made in subjects with TSH concentration > 4.5 μ IU/ml (normal value 0.34–4.25 μ IU/ml) and <10 μ IU/ml and normal thyroid hormone concentrations (total T4: 70–151 nmol/l; total T3: 1.2–2.1 nmol/l). The diagnosis of clinically manifest or overt hypothyroidism will require reduced total T4 concentrations (< 70 nmol/) and elevated TSH levels (TSH > 10 μIU/ml).[24,25]

Inclusion and Exclusion Criteria

Inclusion criteria

Adult patients with fatty liver and no significant alcohol consumption (defined as greater than 40 g/day) were included in the study.[1]

Exclusion criteria

The following criteria were excluded from the study:

- Patients with hepatitis B virus and hepatitis C virus positivity
- Liver diseases of other known causes
- Patients consuming a significant amount of alcohol or drugs such as estrogen, ATT, tamoxifen, methotrexate, and amiodarone[2]
- Intake of iodine, antithyroid agents, or thyroid hormone
- Pregnant women
- Unwilling or incapacity to provide informed consent.

Method of Data Collection

Patients, who have undergone USG of whole abdomen examination in the radiology department for some or other reason and incidentally diagnosed to have fatty liver, are considered. After excluding relevant patients study group, patients were evaluated for liver function and thyroid profile.

RESULTS AND ANALYSIS

Among all the patients of NAFLD (n: 120) 36.70% were male and 63.30% were female. Commonest age group was 31–50 years (45.80%), whereas 37.50% was >50 years & 15% was in 18–30 years of age group [Figure 1].

It was found that 34.20% of NAFLD patients were diabetic and 31.70% were hypertensive.

Among all NAFLD patients, 77.50% were having normal transaminase level and only 22.50% had raised transaminase levels (NASH). However, male NAFLD patients had more transaminasemia (36.4%) than female (14.4%).

Hypothyroidism was found among 25.8% of total patients (subclinical hypothyroidism 18.30% and overt hypothyroidism 7.50%) and hyperthyroidism was 0.80%. Among the patients with normal transaminase, 20.50% were hypothyroid (15.10% subclinical and 5.40% overt), and among patients with raised transaminase level, 44.44% were hypothyroid (29.63% subclinical and 14.81% overt) [Figure 2].

Pearson Chi-square test was applied to find out the association between transaminase level and hypothyroidism, which shows that they have a strong association with $P = 0.013$ (<0.05), that is, patients with raised transaminase level (NASH) than with normal transaminase are more prone to develop hypothyroidism.

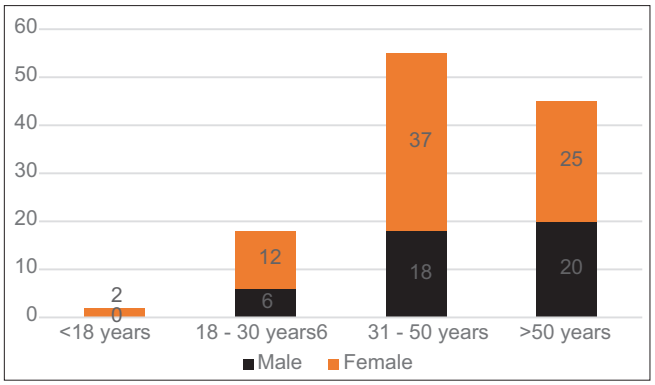

Figure 1: Age and sex distribution of non-alcoholic fatty liver disease

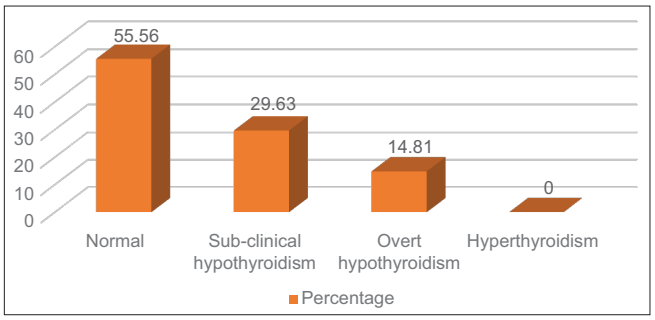

Figure 2: Thyroid status in patients with raised transaminase level

DISSCUSSION

NAFLD is gradually becoming the most common cause of liver disease worldwide, similarly in developing counties. This study was conducted in a tertiary care center of the Northeastern region of India to see the thyroid profile of patients with NAFLD and to see the association between transaminase level and thyroid disorder. The study showed that there is a female preponderance (63.3%) among NAFLD patients, and common age group was 31–50 years (mean age of all NAFLD patients was 46.07 years), that is, most productive age. Pagadala *et al.* conducted a cross-sectional study with 233 patients, which also showed female preponderance (56.2%). Raised transaminase (NASH) was found in 22.5% of NAFLD patients, but there was a male preponderance (36.4% male vs. 14.4% female).

The study shows that though NAFLD had female preponderance (63.3% vs. 36.7%), developing NASH had male preponderance (36.4% vs. 14.4%). Harrison's Principles of Internal Medicine has stated that the prevalence of NASH in NAFLD, at any given point, is about 25%. Almost similar result was obtained in this study. Almost one-fourth patients of NAFLD were having hypothyroidism and hyperthyroidism was insignificant (0.8%). The study conducted by Pagadala *et al.* showed that the frequency of hypothyroidism in NAFLD patients was 21%. Raised transaminase was closely associated

with thyroid dysfunction (subclinical and overt hypothyroid), which was statistically highly significant. A higher frequency of hypothyroidism was demonstrated in patients with NASH than to NAFLD (44.44% vs. 20.5%).

The study conducted by Pagadala *et al.* showed that hypothyroidism was more frequent among patients of NAFLD with NASH than to NAFLD without NASH (25% vs. 12.8%). Pearson Chi-square test is applied to find out the association between transaminase level and hypothyroidism, which shows that they have a strong association with $P = 0.013$ (<0.05), that is, patients with raised transaminase level (NASH) than with normal transaminase are more prone to develop hypothyroidism.

The study showed that among total patients of NFLD, 41.7% was found to be in Grade 1, 43.3% was found to be in Grade 2, and 15.0% was found to be in Grade 3. The study also showed that 34.2% of NAFLD patients were diabetic and 31.7% were found to be hypertensive.

CONCLUSION

This study shows that though female was more prone to develop NAFLD, male was more prone to develop raised transaminase level.

Most of the patients were among the age group of 31–50 years. Hypothyroidism (subclinical + overt) was present in about 25.8% of all study subjects of NAFLD, and it was more frequent in patients with raised transaminase level.

It is concluded that all diagnosed patients of NAFLD should be evaluated for thyroid function at the time of diagnosis and subsequently at a regular interval, particularly where there is a raised transaminase.

Hypothyroidism may accelerate the progress of NAFLD and simultaneously progress of NAFLD may be associated with more number of subclinical and overt hypothyroid diseases.

This study may form a matrix to the future study for cause and effect relationship of NAFLD and thyroid disease.

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Original Article

Correlation between Three Methods of Blood Pressure Measurement (Impedance Cardiography, Sphygmomanometry, and Invasive Methods)

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Abstract

Aims and Objectives: The aims of the study were to find out the correlation between three methods of blood pressure (BP) measurement with impedance cardiography (ICG) device, conventional non-invasive sphygmomanometer, and cath lab-based invasive arterial pressure (AP) study.

Patients Materials and Methods: Patients who had definite indications for coronary angiography (CAG) or coronary intervention due to cardiac reasons were selected for the measurement of BP by three methods, namely, by transducer-based invasive central aortic pressure study, by ICG, and by conventional sphygmomanometry. One hundred patients of acute myocardial infarction having chest pain, ST elevation in two or more contiguous leads of electrocardiogram (ECG), biomarker positivity, and echocardiographic evidence of regional wall motion abnormality were selected. Transfemoral or radial access of the ascending aorta allowed the measurement of central aortic pressure during invasive procedure. CAG was done in the cath lab having "Siemens™ Axiom Artis Zee (floor)" equipment. The subjects who were unwilling to participate, who were moribund, critically ill subjects, and patients with concomitant heart failure, arrhythmia, and valvular lesions were excluded from the study. GE™ Vivid 7 Dimension machine was used for ECG-gated echo-Doppler studies. ICG-derived BP values (systolic BP [SBP], diastolic BP [DBP], mean AP [MAP], and pulse pressure) were recorded for comparison with similar pressure data obtained from two other methods.

Results and Analysis: Analysis of results show a comparison of data on SBP, DBP, and MAP measured by three methods by sphygmomanometry, invasive, and ICG methods. The analysis also shows the values of correlation coefficients – all of which are significantly positive correlations. ICG has been found to have positive correlation with both sphygmomanometric and invasive methods of BP measurement. It also shows a graphical presentation of the correlation between SBP, DBP, and MAP measured by three methods by sphygmomanometry, invasive, and ICG methods.

Conclusion: There is a significant correlation between three methods of BP measurement with ICG device, conventional non-invasive sphygmomanometer-based method, and cath lab-based invasive AP study.

Key words: Augmentation index, Coronary angiography, Diastolic blood pressure, Impedance cardiography, Mean arterial pressure, Pulse pressure, Systolic blood pressure

INTRODUCTION

Blood pressure (BP) can be measured in many non-invasive and invasive ways. The most commonly clinically used technique is auscultatory technique using mercury-based sphygmomanometers. Oscillometric techniques are also used in BP measuring devices. All these are big size devices. Non-invasive photoplethysmography (optoelectronic) based technique and impedance plethysmography based estimation of BP are still at experimental level and need further validation before wide use in clinical practice. Invasive intra-arterial BP estimation is done in the cardiac cath labs, operation theaters, and intensive care units for different indications.

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Despite the availability of many established pre-existing techniques, the BP measurement by newer impedance cardiography (ICG) device bears the potential of some extra advantages inclusive of wearability and portability – that is why in recent years, there is renewed interest in evaluating the role of ICG. We have been also working on the hemodynamic aspects of ICG. The basic principles and technical details of the ICG device used by us were designed by Ghosh *et al.*, from School of Medical Science and Technology (SMST), Indian Institute of Technology (IIT), Kharagpur, and have been discussed earlier.[1,2]

Aims and Objectives

The aims of this study was to record each of systolic BP (SBP), diastolic BP (DBP), mean arterial pressure (MAP), and pulse pressure (PP) predicted by ICG, invasive method, and sphygmomanometry from patients of acute myocardial infarction (AMI) and find out correlation between three methods and validation of the data derived from ICG. The objective of selecting only patients of AMI was that invasive coronary angiography (CAG) (with or without intervention) was indicated on medical ground and not for research purpose only. This provided the facility of measuring invasive method of measuring BP within ethical boundary.

PATIENTS MATERIALS AND METHODS

Patients who had definite indications for CAG or coronary intervention due to cardiac reasons were selected for the measurement of BP by three methods, namely, by transducer-based invasive central aortic pressure study, by ICG, and by conventional sphygmomanometry. One hundred patients of AMI having chest pain, ST elevation in two or more contiguous leads of electrocardiogram (ECG), biomarker positivity, and echocardiographic evidence of regional wall motion abnormality were selected. Transfemoral or radial access of the ascending aorta allowed the measurement of central aortic pressure during invasive procedure. CAG [Figure 1] was done in the cath lab having "Siemens™ Axiom Artis Zee (floor)" equipment. The subjects who were unwilling to participate, who were moribund, critically ill subjects, and patients with concomitant heart failure, arrhythmia, and valvular lesions were excluded from the study. GE™ Vivid 7 Dimension machine was used for ECG-gated echo-Doppler studies. ICG measured amplitudes of the different peaks of the ICG waves and the augmentation index (AIx). ICG predicted SBP, DBP, mean arterial BP, and PP were recorded for comparison with similar pressure data obtained from two other methods. ICG device used in this study was designed and developed by Ghosh *et al.,* in the SMST, IIT, Kharagpur, and the details of the device have already been published in Artificial Intelligence in Medicine.[1] Figure 2 shows that C1 and C2 are excitation electrodes and R1–R2 are voltage-sensing electrodes placed on skin overlying the course of radial artery. Figure 3 shows the waveform. The waveforms were differentiated, filtered, and again differentiated. The difference between the two crests (second order and first order) was rendered by the subtractor inbuilt and the divider integrated divided that by the first crest amplitude. The technical details of the device are beyond the scope of this clinical publication.

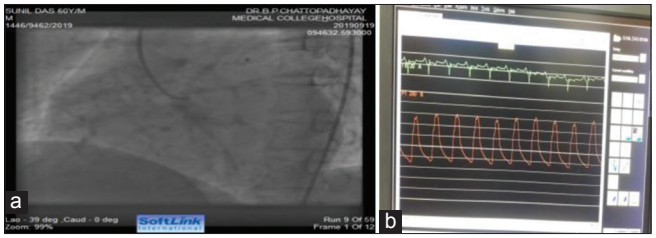

Figure 1: (a and b) Invasive catheter in ascending aorta and pressure tracing

RESULTS AND ANALYSIS

The present study was a hospital-based cross-sectional study conducted on 100 patients admitted in the

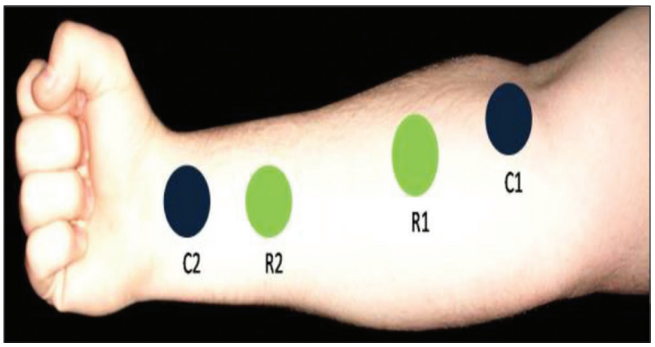

Figure 2: Electrode placement on the forearm of the subject

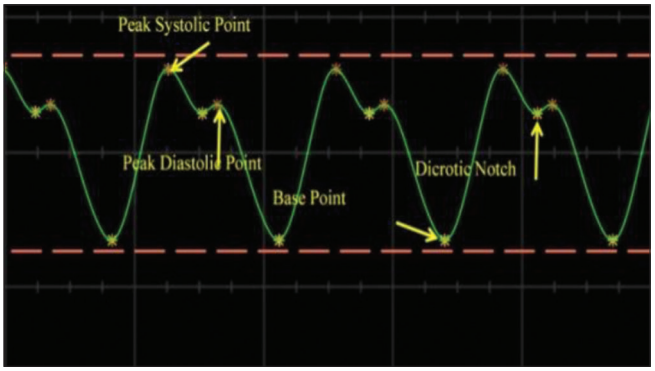

Figure 3: Impedance cardiography signal after filtering

cardiology department of medical college and hospital, Kolkata. In our study, 48% were female and 52% were male. The mean ± standard deviation (SD) age was 50.32 ± 8.125 years. Mean height mean ± SD was 163.85 ± 8.158 cm among the population. Mean weight and body mass index was 64.94 ± 8.348 kg and 24.1182 ± 3.11, respectively. Among the study population, 51% of patients are previously diagnosed hypertensive and 49% are normotensive. Among the study population, 35% had diabetes, either type 2 or type 1 and 65% were non-diabetic. About 29% of the study subjects were suffering from dyslipidemia. About 42% of the study population had a positive family history of diabetes. About 34% had a positive family history of hypertension and 21.6% had a history of AMI among family members. ECG wise, there were 100% of cases of ST-elevation MI and troponin T was positive in all cases in consonance with the inclusion criteria. According to ECG in our study population, there was involvement of wall as follows: Anerolateral in 28% of cases, anterior wall in 26%, inferior wall in 21%, anterior with inferior in 3% of cases, anteroseptal 7%, septal 3%, inferior with posterior wall 5%, 2% cases, global in 4%, and lateral 6%.

Tables 1–3 show a comparison of data on SBP, DBP, and MAP measured by three methods by sphygmomanometry, invasive, and ICG methods. Table 4 shows the values of correlation coefficients, all of which are positive correlations. ICG has been found to have a positive correlation with both sphygmomanometric and invasive methods of BP measurement. Figure 4 shows graphical presentation of the correlation between SBP, DBP, and MAP measured by three methods by sphygmomanometry, invasive, and ICG methods.

Table 1: Comparison of SBP by sphygmomanometry, invasive, and ICG methods (*n*=100)

SPG-SBP		INV-SBP		ICG-SBP	
Mean	137.9375	Mean	138.85	Mean	138.225
Standard error	1.729705447	Standard error	1.670679768	Standard error	1.669151892
Median	140	Median	141	Median	140
Mode	140	Mode	142	Mode	140
SD	15.47095584	SD	14.94301412	SD	14.92934838
Sample variance	239.3504747	Sample variance	223.2936709	Sample variance	222.885443
Count	100	Count	100	Count	100
Confidence level (95.0%)	3.442892512	Confidence level (95.0%)	3.325404838	Confidence level (95.0%)	3.322363678

SBP: Systolic blood pressure, ICG: Impedance cardiography, SD: Standard deviation

Table 2: Comparison of DBP by sphygmomanometry, invasive, and ICG methods (*n*=100)

SPG-DBP		INV-DBP		ICG-DBP	
Mean	86.85	Mean	87.3125	Mean	87.125
Standard error	1.190296	Standard error	0.972012	Standard error	1.018092
Median	90	Median	90	Median	88
Mode	92	Mode	90	Mode	90
SD	10.64633	SD	8.693943	SD	9.106091
Sample variance	113.3443	Sample variance	75.58465	Sample variance	82.92089
Count	100	Count	100	Count	100
Largest (1)	110	Largest (1)	112	Largest (1)	110
Smallest (1)	60	Smallest (1)	60	Smallest (1)	60
Confidence level (95.0%)	2.369224	Confidence level (95.0%)	1.934742	Confidence level (95.0%)	2.026461

DBP: Diastolic blood pressure, ICG: Impedance cardiography, SD: Standard deviation

Table 3: Comparison of MAP by sphygmomanometry, invasive, and ICG methods (*n*=100)

SPG-MAP		INV-MAP		ICG-MAP	
Mean	86.85	Mean	87.3125	Mean	87.125
Standard error	1.190296	Standard error	0.972012	Standard error	1.018092
Standard deviation	10.64633	Standard deviation	8.693943	Standard deviation	9.106091
Sample variance	113.3443	Sample variance	75.58465	Sample variance	82.92089
Count	100	Count	100	Count	100
Largest (1)	110	Largest (1)	112	Largest (1)	110
Smallest (1)	60	Smallest (1)	60	Smallest (1)	60
Confidence level (95.0%)	2.369224	Confidence level (95.0%)	1.934742	Confidence level (95.0%)	2.026461

MAP: Mean arterial pressure, ICG: Impedance cardiography, SD: Standard deviation

DISCUSSION

Before going into the discussion of correlation between methods of the measurement of BP by ICG, invasive method, and sphygmomanometry, some basic facts about ICG will be reviewed. ICG is a relatively new tool, yet to be widely utilized. ICG can give information about the function of the heart. Kubicek *et al.*[3] were the pioneer to introduce ICG for measuring cardiac output, stroke volume (SV), and body fluid composition in 1966. ICG measures the ionic conduction of human body depending on the variation of impedance or resistance. When alternating current is injected to the tissue overlying a vessel, the ease or resistance to flow of current depends mainly on the instantaneous impedance attributable to the blood within the arteriovenous compartment underneath and the impedance depends relatively less on the other tissues surrounding the artery. Blood contains electrolytes and charged particles or ions. The variation of volume of arterial blood within a specific part of the body in respect of time is deemed responsible for variation of the static and transient values of electrical conductivity. Before Kubicek, the variation in impedance (ΔZ) obtained due to the pulsatile, peripheral blood flow of limbs has been mathematically related to the pulsatile change in volume by Nyboer *et al.*,[4] 1950. Vessels are considered as volume conductors. Vessel segment in the limbs has been studied and by application of transfer function central aortic waveforms, pulse wave velocity has been derived by many workers. In this connection, it is necessary to emphasize the importance of the rate of change of impedance (dz/dt) and the maximum rate of change of impedance (dz/dt_{max}).

Tetrapolar electrodes were used in our study. Low-intensity high-frequency steady current is injected through outer two electrodes (C1–C2) and the receiving of the signal of variation of impedance (dZ) at the electrode-skin as well as tissue-vessel interface is acquired by the inner two electrodes [R1–R2 of Figure 2]. The signal so acquired from a segment of vessel under study is processed and filtered. Figure 2 shows that C1 and C2 are excitation electrodes and R1–R2 are voltage-sensing electrodes placed on skin overlying the course of radial artery. Figure 3 shows the waveform. The waveforms were differentiated, filtered, and again differentiated. The difference between the two crests (second order and first order) was obtained from the subtractor (augmented pressure) and the augmented pressure was divided by the PP value (difference between systolic and diastolic pressures).

Studies on correlation between ICG versus applanation tonometry in the measurement of pulse wave velocity[5] despite being limited in number reveal that they are in good agreement with each other. Many hemodynamic parameters such as SV,[6] left ventricular ejection fraction (LVEF), and AIx can be derived from ICG waveforms. AIx is the ratio between augmentation pressure and PP. Augmentation pressure is the difference between two peaks of the systolic

Table 4: Correlation coefficients

Correlation between	Correlations		
	SBP (r)	DBP (r)	MAP (r)
Spygmo versus INV	0.96177147	0.878096024	0.943255
Spygmo versus ICG	0.9741539	0.918881483	0.962693
INV versus ICG	0.98630466	0.929906314	0.974367

ICG: Impedance cardiography, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, MAP: Mean arterial pressure

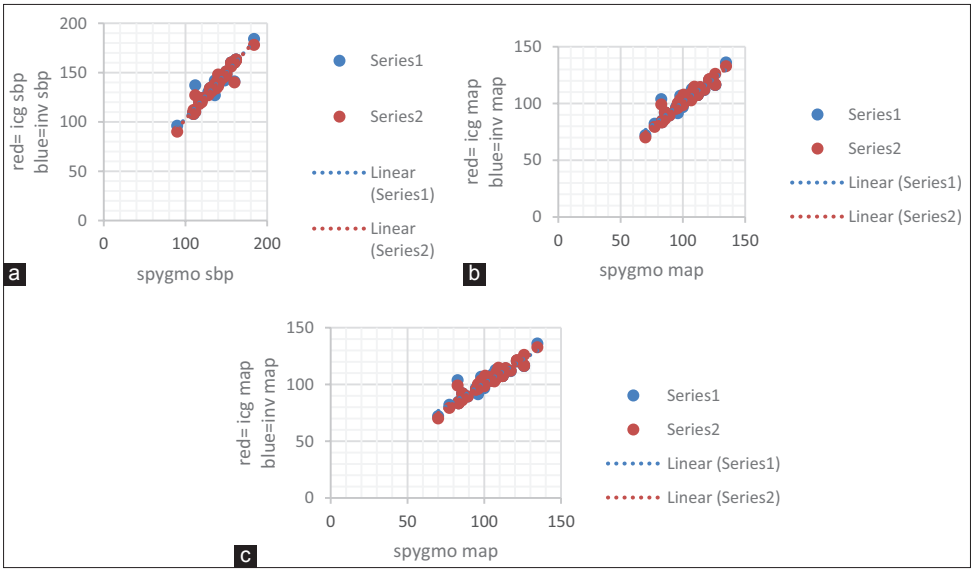

Figure 4: (a-c) Correlation between systolic blood pressure (BP), diastolic BP, and mean arterial pressure measured by three different methods (sphygmomanometry, invasive, and impedance cardiography)

pressure and is attributable to the contribution of the reflected wave. PP is the difference between the systolic pressure and the diastolic pressure identified in the ICG waveform. AIx can be estimated by applanation tonometry as well as by ICG.[5] Radial tonometry-derived AIx has been shown to correlate with the extent of the coronary artery disease,[3] LV hypertrophy,[4] urinary albumin excretion,[7] maximal aortic intima-media thickness,[8] cardiovascular events,[9] and all-cause mortality.[5,6,10-14] In the present work, we have studied the ICG-derived BP, invasive BP, and conventional sphygmomanometer-based BP.

The result and analysis of the data obtained reveal that ICG is well in agreement with the gold standard invasive method of BP measurement as well as conventional sphygmomanometric method of measurement.

CONCLUSION

There is a significant correlation between three methods of BP measurement with ICG device, conventional non-invasive sphygmomanometer, and cath lab-based invasive AP study. The ICG-derived BP data have been validated by this correlation. However, further large-scale studies are required.

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Original Article

Prevalence of Depression and Suicidality in Schizophrenia - A Cross Sectional Study

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Abstract

Background: Schizophrenia is a major mental illness with outcomes ranging from complete recovery to severe disability. Suicide is the most devastating outcome of schizophrenic illness. Around 25% of patients with schizophrenia suffer from comorbid depression. Hence, this study was conducted to find out the prevalence of suicidal ideation and its associated factors among schizophrenia patients and to determine the association between depression and suicidal ideation.

Aim: The aim of the study was to study the prevalence of depression and suicidality in schizophrenia.

Methodology: This was a cross-sectional study of 100 patients with schizophrenia carried out at the Institute of Mental Health, Chennai. Study tools used were semi-structured pro forma which included the social-demographic questionnaire, Calgary Depression Scale for Schizophrenia, and Positive and Negative syndrome scale (PANSS).

Results: About 11 and 23 participants were found to be having suicidal ideation and depression, respectively. Marital status, educational status, insight, and past suicide attempts were significantly associated with the presence of suicidal ideation with P = 0.015, 0.001, 0.019, and 0.001, respectively. PANSS score (P = 0.001) and prevalence of depression (P = 0.001) were significantly higher among patients with suicidal ideation.

Conclusion: Individuals suffering from schizophrenia are at high risk for making suicidal attempts, when accompanied by depressive symptoms and psychiatrists must intervene aggressively and early. More attention should be reserved for the high-risk group which includes those with a history of suicidal attempts and those having an insight into their illness.

Key words: Calgary Depression Scale for Schizophrenia score, Depression, Schizophrenia, Suicidal ideation

INTRODUCTION

Schizophrenia is a severe mental illness with outcomes ranging from complete recovery to severe disability. Suicide is the most devastating outcome of schizophrenic illness.[1] Individuals with schizophrenia are at higher risk of committing suicide, with around 5% completing the act and about 20% or more making at least one attempt at some point in their lifetime.[2]

The risk of suicide is increased near the onset of illness and remains high during the initial years of treatment and declines over time.[3] The risk factors include younger age at symptom onset, good premorbid functioning, high expectations from life, and awareness that lives expectations are unlikely to be met, awareness of being mentally ill, and poor drug adherence.

Male gender, unmarried status, living alone, being unemployed, and access to lethal means are also risk factors.[4] Other factors with robust evidence of high risk of suicide were previous depressive disorders, past suicide attempts, fear of mental disintegration, poor drug compliance, and recent loss.[5]

Around 25% of patients with schizophrenia suffer from comorbid depression. It is associated with higher impaired functioning, increase relapse rate, frequent hospitalization, and suicide.[6]

In the study, we have tried to find the difference between schizophrenia with suicidal ideation and without; in

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search of possible risk factors for suicide and to establish the relation with comorbid depression. This study was conducted with the following objectives: To find out the prevalence of suicidal ideation and depression among the individuals with schizophrenia on follow-up in outpatient department for 6 months, to compare the clinical and social demographic profile of patients suffering from schizophrenia with and without suicidal ideation and to study the relationship between depression and suicide ideation in those individuals.

Aim

The aim of the study was to study the prevalence of depression and suicidality in schizophrenia.

METHODOLOGY

This was a cross-sectional study carried out at the Institute of Mental Health, Chennai, among patients suffering from schizophrenia aged between 18 and 60 years and who have been under treatment for at least 6 months. Patients with comorbid major psychiatric illness, substance abuse, patients who need urgent medical intervention and non-consenting, non-cooperative patients were excluded from the study. About 100 patients were selected by consecutive sampling.

Study tools used were semi-structured proforma to include the social-demographic data, family history, duration of illness, and other details pertinent to the study. Clinical interview for diagnosis of schizophrenia was made using International Classification of Diseases version 10 criteria. Positive and negative syndrome scale (PANSS) is a rating scale used for measuring symptom severity of patients with schizophrenia. Positive symptoms refer to an excess or distortion of normal functions (for example, delusions and hallucinations). Negative symptoms represent a diminution or loss of normal function. The positive scale includes seven items (minimum score of 7 and a maximum of 49). The items included are delusions, conceptual disorganization, hallucinations, grandiosity, hyperactivity, suspiciousness/persecution, and hostility. The negative scale again includes seven items with a minimum score of 7 and maximum score of 49. The scale includes the following items blunted effect, emotional withdrawal, poor rapport, passive/apathetic social withdrawal, stereotype thinking, lack of spontaneity, and flow of conversation, difficulty in abstract thinking. General psychopathology scale includes 16 in which the 12th item is used to grade insight. PANSS gives a total score minimum of 30 and a maximum of 210. We evaluated the patients for depressive symptoms based on ICD 10 diagnostic criteria for a depressive episode. Those who were found to be meeting the criteria for depressive episodes as per ICD 10 were given the Calgary depression rating scale for schizophrenia (CDSS). It has nine items which are rated from 0 to 3. The CDSS score is obtained by adding each of the item scores. A score above six has 82% specificity and 85% sensitivity for predicting the presence of a depressive episode. The scale has good construct validity and both internal and inter-rated reliability. Suicidal ideation was assessed with scale for suicidal ideation (SSI).

Ethical approval was obtained from the ethics committee of the Madras Medical College. Chennai. Informed written consent was obtained from the participants in their mother tongue. The confidentiality of the participants was assured.

Data were entered and analyzed using IBM SPSS software version 20. Descriptive statistics such as percentages and mean were used. The analysis was done using the Chi-square test and *t*-test. $P < 0.05$ was taken as statistically significant.

RESULTS

Among the 100 consecutive individuals with schizophrenia who had come for regular follow-up and were the study population, 11% were found to have suicidal ideation [Figure 1].

Figure 2 shows that 23% of the individuals with schizophrenia were found to meet the criteria for depression.

Marital status, educational status, insight, and past suicide attempts were significantly associated with the presence of suicidal ideation with $P = 0.015$, 0.001, 0.019, and 0.001, respectively [Table 1]. PANSS P score was significantly higher ($P = 0.001$) in those patients who had suicidal ideation (18.8182 ± 10.11) than those who were not having suicidal ideation (12.54 ± 5.28) [Table 2].

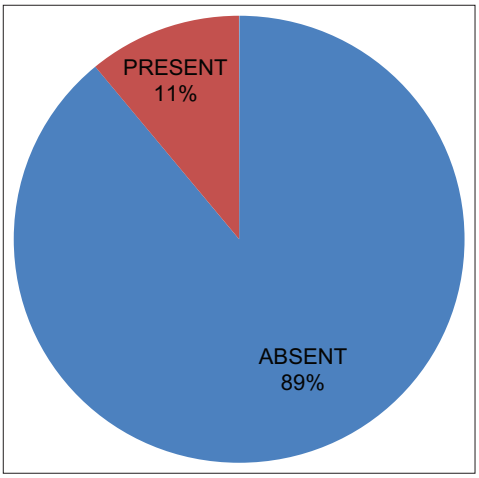

Figure 1: Suicidal ideation in the study population

Table 3 shows that the prevalence of depression higher in patients with suicidal ideation (60.9%) as compared to those without suicidal ideation (39.1%) and it was found to be statistically significant ($P < 0.001$).

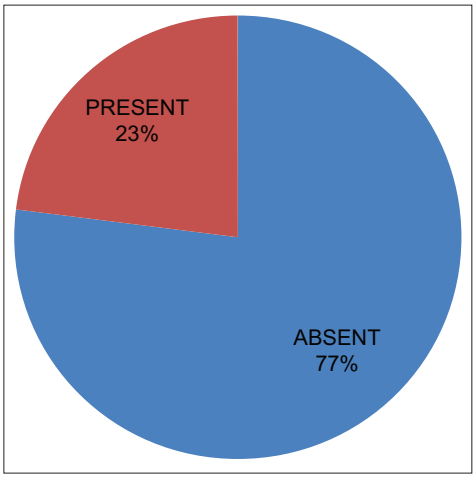

Figure 2: Depression in the study population

Table 1: Association of suicidal ideation with selected variables of interest

Variables	Suicidal ideation		Total	*P* value
	Absent	Present		
Age group (years)				
<21	1	0	1	0.220
21–30	12	1	13	
31–40	20	6	26	
41–50	30	3	33	
51–60	26	1	27	
Sex				
Female	34	2	36	0.192
Male	55	9	64	
Marital Status				
Married	36	0	36	0.015
Separated	28	4	32	
Single	25	7	32	
Education				
Graduate	13	5	18	0.001
Illiterate	6	0	6	
Primary	57	1	58	
Secondary	13	5	18	
Occupation				
Employed	27	2	29	0.402
Unemployed	62	9	71	
Duration of illness (years)				
0–5	22	2	24	0.081
5–10	15	5	20	
Above 10	52	4	56	
Drug complications				
Good	76	7	83	0.070
Poor	13	4	17	
Insight				
Absent	43	3	46	0.019
Partial	25	1	26	
Present	21	7	28	
Family history				
Absent	54	5	59	0.331
Present	35	6	41	
Past suicide attempts				
Absent	75	3	78	<0.001
Present	14	8	22	

DISCUSSION

The role of various demographic variables in suicidal behavior among those with schizophrenia has given contrasting results across several studies. Young males suffering from schizophrenia have been consistently found to be at a higher risk for suicide. Tsuang reported lesser suicide risk among females suffering from schizophrenia.[7] In our study, we could not establish that gender to be associated with suicidal ideation among individuals with schizophrenia.

Unemployment is reported in various studies to be a risk factor for suicidal ideation among those with schizophrenia. Nine of the 11 individuals with suicidal ideation, in our study, were unemployed but compared to the individuals without suicidal ideation; there was no statistically significant difference in this regard. The results of this study were similar to the ones by Appleby *et al.* and Harkavy which found the role of unemployment to be overstated.[8]

According to the study published by Radomsky *et al.*, being single, separated, or divorced did not appear to confer a higher risk for suicidal ideation in psychosis.[9] But this result was in contrast to several other studies which state that majority of the suicide among schizophrenia were committed by those who were single or separated. Our study also reported a significant association between marital status and suicidal ideation among patients with schizophrenia. Poor family support and social isolation are considered to be risk factors for suicide in schizophrenia.

Table 2: Association of PANSS score with suicidal ideation

Suicidal ideation	*n*	Mean	SD	Std. error mean	*t* value	*P* value
PANSS *P* score						
Present	11	18.8182	10.10760	3.04756	3.300	0.001
Absent	89	12.5393	5.27872	0.55954		
PANSS N score						
Present	11	12.6364	3.58532	1.08102	0.725	0.470
Absent	89	14.5281	8.53481	0.90469		

PANSS: Positive and negative syndrome scale

Table 3: Association of depression with suicidal ideation

Calgary depression scale for schizophrenia		Suicidal ideation		Total	*P* value
		Absent	Present		
Absent	Count	75	2	77	<0.001
Present	Count	14	9	23	

In our study, 11 of the 11 individuals with suicidal ideation were found to be living in a nuclear family-type of setting.

Both prominent delusions and persistent hallucination have been reported to be associated with a higher risk for suicide in schizophrenia. A study done by Kaplan and Harrow also found that positive symptoms of schizophrenia correlated with suicidal behavior.[10] Our results were similar to those noted in various studies which report that suicidal behavior in schizophrenia was related to the severity of the illness, especially the positive symptoms.[11]

Most of the studies have not established a significant association between suicidal ideation and negative symptoms[12] similar to the findings in our study.

Several studies have reported depressive symptoms to be strongly associated with suicidal behavior among patients with schizophrenia. Kuo *et al.*, 2005, reported that depressive symptoms even during the residual phases of schizophrenia to be related to higher suicidal ideation.[13] All these have emphasized that feelings of hopelessness as one of the major factors related to suicidal attempts among individuals with schizophrenia. The results of our study also came to the same conclusion. There was a strong and significant relationship between the presence of depressive symptoms and suicidal ideation. The majority was males belonging to the 31–40 years age group, single or separated, with education levels up to secondary levels or was graduates and was unemployed. Most of them were having good insight into their illness, had a family history of psychiatric illness, and were living in a nuclear family.

Just after discharge from the hospital, patients with schizophrenia may experience new adversities or have to return to ongoing difficulties. Moreover, as a result they have become dejected and experienced feelings of hopelessness and helplessness. They eventually reach a depressed state and later act on suicidal ideas. Impulsive acts are also common in schizophrenia, where the individuals were found to have a low threshold for tolerance. Nearly one-third of those with the history of suicide attempts in our study attributed depression as the reason behind their attempt.

Although reported to be a prominent contributory factor for suicidal attempts, hallucinations are the leading factors for suicidal attempts only in a very small proportion in our study. Command hallucinations have been found to be rare in both attempted and completed suicides.[14] Harkavy also reported that individuals with schizophrenia who are already at risk for suicide (depressive features and past suicidal attempts) may be at an increased risk for suicidal attempts while experiencing command hallucinations.

The notion that better insight into the illness may be associated with greater suicidal behavior is supported by the study done by Amador *et al.*[15] They have also stated that awareness in patients about the negative symptoms and delusions were associated with suicidal thoughts. Contrary to expectations, general awareness of suffering from a mental disorder did not predict suicidal tendencies. In our study, 7 of 11 individuals with suicidal ideation had good insight into their illness. There are also chances for more than one factor operating in an individual at the time of suicide attempt (for example, individual getting depressed due to persistent hallucinations and attempting suicide) that was our conclusion while we evaluated the reasons behind the past suicide attempts.

Individuals suffering from schizophrenia are at a high risk of making suicidal attempts, especially when accompanied by depressive symptoms. Psychiatrists must be wary of this fact and should intervene aggressively and early. More attention should be reserved for the higher risk group, which includes those with a history of suicidal attempts and those having an insight into their illness.

The study had the following limitations. As this study was conducted in a tertiary care government hospital, the sample population cannot be considered representative of the illness. Certain variables such as socio-economic status, educational, and employment status were not adequately represented. Since it is a cross-sectional study in which each individual was assessed over a single session, it is possible that some of them might have minimized the symptoms of depression and suicidal ideation. Recall bias could have influenced the patients recollecting details regarding past suicidal attempts. Only the individuals who have survived the past suicidal attempts were analyzed. To analyze the entire suicidal behavior, completed suicide also needs to be studied.

CONCLUSION

Clinicians should be aware of the protective factors. They include adherence to therapy, family support for affected individuals, and against the stigma that arises from the illness, prompt and appropriate antidepressive therapy, simple and hebephrenic subtypes of schizophrenia, the possibility of communicating the intent to commit suicide, and negative family history for suicide. Atypical antipsychotics have also proven to be a protective factor. There should be regular sessions of family therapy following discharge from the hospital. Psychiatrists should also focus on state-dependent risk factors such as depression, substance abuse, social isolation, loss of faith in treatment, and psychotic symptoms rather than on trait-dependent risk factors such

as age, gender, socio-economic status, and marital status which are difficult to modify.

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Original Article

Prediction of Difficult Laparoscopic Cholecystectomy Based on Clinical and Ultrasonographic Parameters

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Abstract

Background: Cholelithiasis is the most common biliary pathology. The definitive treatment for cholelithiasis is either open/laparoscopic cholecystectomy (LC). The objective of this study was to predict difficulty in doing LC based on clinical and ultrasonographic parameters.

Materials and Methods: A hundred patients admitted with a diagnosis of cholelithiasis in surgical wards in the Department of Surgery, Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa, from June 1, 2018, to May 31, 2019, were included in the study. All necessary investigations were carried out. X-ray, ultrasonography (USG) abdomen, and blood investigations were done. Patients underwent LC, and a careful record of pre-operative and post-operative findings was made and carefully filled in the pro forma.

Results: In the present study, body mass index >27.5 kg/m^2 (27%) shows a correlation with predicting difficult LC and conversion to open procedure. Clinical parameters such as guarding and rigidity (8%) with mass (12%) were a sign of acute inflammation, associated with ultrasonography findings favor for difficult cholecystectomy. Gallbladder wall thickness (38%) and pericholecystic fluid collection (16%) in USG are strong predictors of difficulty.

Conclusion: Clinical and USG findings help to predict difficulty in laparoscopic cholecystectomy and leading to the conversion of LC to open cholecystectomy.

Key words: Conversion, Difficulty, Laparoscopic cholecystectomy, Open cholecystectomy

INTRODUCTION

Cholelithiasis is the most common biliary pathology. Cholelithiasis is one of the most common problems affecting the digestive tract. The prevalence of gallstones is related to factors such as age, gender, and ethnic background. The prevalence of gallstone varies widely from place to place. In India, the prevalence is estimated to be around 4%.[1] Changing incidence in India is mainly attributed to the Westernization of diet, change in socioeconomic structure, and availability of ultrasound as an investigation in both rural and urban areas.

An epidemiological study showed that North Indians have 7 times higher occurrence of gallstones as compared to South Indians.

The National Institute of Health consensus development conference in the year 1992 concluded that laparoscopic cholecystectomy (LC) provides a safe and effective treatment for most patients with symptomatic gallstones.

At present, LC is considered the treatment of choice for symptomatic cholelithiasis. Philip Mouret from France performed the first human LC in 1987. Just after 2 years, the first LC was done in India by Udwadia in 1989. The difficult gallbladder (DGB) is the most common "difficult" laparoscopic surgery being

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performed by a general surgeon all over the world. Minimal post-operative morbidity resulting from minimal invasiveness, along with safety and efficacy has made LC gold standard treatment for symptomatic cholelithiasis. It has now become the most common operation performed by general surgeons. Various pre-operative factors can help in deciding the DGB and its conversion to open cholecystectomy.

It has many advantages over open cholecystectomy in terms of minimal post-operative pain, shorter hospital stay, better cosmetics, and early recovery. As the experience with LC is increasing throughout the world, selection criteria have become more liberal. Most of the factors such as morbid obesity and previous upper abdominal surgery which were considered as an absolute contraindication for attempting LC, have no longer remained as absolute contraindications. LC though considered safe and effective, yet can become difficult at times due to various problems faced during the surgical procedure. Various problems encountered include problems in identifying anatomy, anatomical variation, creating pneumoperitoneum, accessing peritoneal cavity, releasing adhesions, and extracting the GB. LC with these problems along with the time taken more than normal is regarded as difficult. The number of contraindications has come down significantly over time. Attempts can be made in all cases of gallstone diseases with laparoscopic procedure except for patients with bleeding diathesis and carcinoma GB and patients not fit for general anesthesia.

However, of all LC, 1–13% requires conversion to an open for various reasons.[2] Thus, for surgeons, it would be helpful to establish criteria that would assess the risk of conversion preoperatively. This would be useful for informing patients, and a more experienced surgical team could be assembled when the risk for conversion appears significant. Thus, this study is conducted at our hospital to predict the difficult LC and conversion using various clinical and ultrasonographic parameters.

Aims and Objectives

The proposed study entitled "prediction of difficult LC based on clinical and ultrasonographic parameters" with the following aims and objectives:

The objectives are as follows:

1. To find the predictive factor on the clinical ground in predicting difficult LC
2. To determine the clinical and radiological factors role in predicting difficult LC
3. To correlate pre-operative factors with intraoperative severity of acute cholecystitis.

MATERIALS AND METHODOLOGY

The proposed study entitled "prediction of difficult LC based on clinical and ultrasonographic parameters" was carried out on 100 patients admitted in a surgical ward in the Department of Surgery, Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa, from June 1, 2018, to May 31, 2019.

Sample Size

Approximate 100 patients during the period of study as per hospital admission rate:

Type of Study

This was a prospective hospital-based time bound study.

Inclusion Criteria

The patients aged between 20 and 60 years, presenting symptoms and signs of cholelithiasis/cholecystitis and diagnosed by ultrasonography of the abdomen were included in the study.

Exclusion Criteria

The following criteria were excluded from the study:

1. Patients below 20 years of age
2. Patients with common bile duct (CBD) calculus, raised alkaline phosphatase, and dilated CBD, where CBD exploration is needed
3. Patients with features of obstructive jaundice
4. Suspected malignant GB disease
5. Patient medically unfit for laparoscopic surgery.

Methodology

A prospective study of all patients admitted from June 1, 2018, to May 31, 2019, for undergoing LC will be used. A minimum of 100 LC will be studied during the period. The patients confirmed by ultrasonography examination will be evaluated with following factors: Age, sex, duration of illness, history of previous hospitalization, concurrent systemic illness, body mass index (BMI), temperature, and abdominal scar whether infraumbilical or supraumbilical, tenderness in the right upper quadrant, palpable GB, complete blood counts and liver function test values, serum amylase, sonographic findings-GB wall thickness, pericholecystic collection, size of calculi, multiple calculi, impacted stone, hydrops of GB, perforated or gangrenous GB, and anatomical variation. Following an evaluation, the patient will be subjected to LC. Time taken, biliary/stone spillage, bleeding during surgery, calot's triangle dissection, GB bed dissection, anatomical variation, injury to duct/artery, difficult extraction of GB, extension of incision, and need for conversion will be noted and operating surgeon grading it: Easy, moderate or difficult, duration of hospital stay, intraperitoneal bile leak, necessity for interventional procedure, or death are considered.

Table 1: Presenting signs

Signs	Present series	%
Tenderness in right hypochondrium	80	80
Guarding	8	8
Mass	12	12

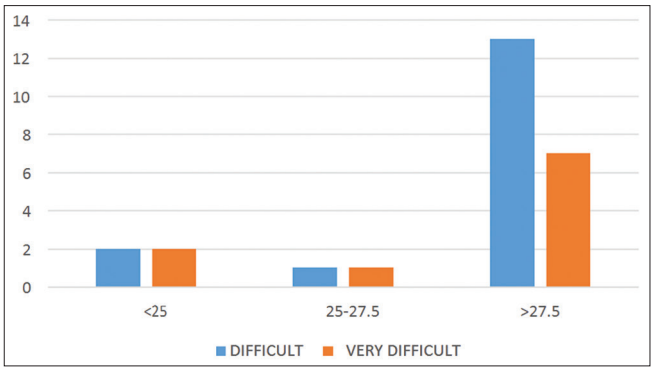
Table 2: BMI and difficulty during surgery

BMI	Difficult	Very difficult
<25	2	2
25–27.5	1	1
>27.5	13	7

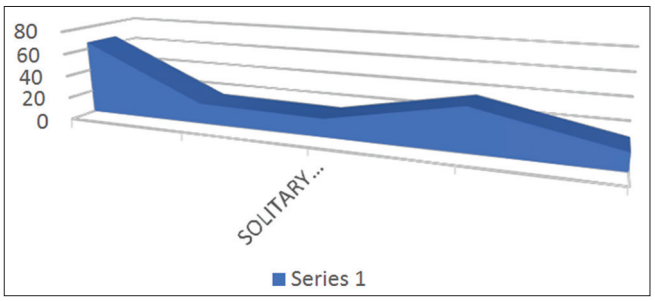
BMI: Body mass index

Table 3: Ultrasonography findings

Ultrasonography	Number of cases (%)
Multiple calculi	66 (66)
Solitary calculi	18 (18)
Solitary impacted calculi	16 (16)
Wall thickening	38 (38)
Pericholecystic collection	16 (16)



Graph 1: Correlation between body mass index and difficulty during surgery



Graph 2: Ultrasonographic finding of patients in study

OBSERVATION AND RESULTS

Tenderness in right hypochodrium was present in 80 (80%) patients, Guarding and rigidity in 8 (8%) patients and a mass was palpable in 12 (12%) patients.

In this study 54 (54%) patients had BMI <25, 22 (22%) were having BMI between 25-27.5 and for remaining 27 (27%) it was >27.5, and difficulty increases with BMI >27.5.

All the 100 patients had stones in gallbladder, 66 patients had multiple calculi, 18 had solitary calculi and 16 had solitary impacted calculi, 38 patients had wall thickening and 16 had pericholecystic collection.

DISCUSSION

The proposed study entitled "prediction of difficult LC based on clinical and ultrasonographic parameters" was carried out on 100 patients admitted in a surgical ward in the Department of Surgery, Shyam Shah Medical College and Associated Sanjay Gandhi Memorial Hospital, Rewa, from June 1, 2018, to May 31, 2019.

LC has become the procedure of choice for the management of symptomatic gallstone disease. DGB is a term coined to denote a procedure with an increased surgical risk compared to standard cholecystectomies and has been associated with difficult dissection, altered anatomy, and increased risk of bleeding.

Pre-operative complexity estimation helps surgeons decide whether to proceed with a minimally invasive approach or perform an open procedure. The use of a predictive score of operative difficulty is thus of primary interest to identify high-risk procedures and could be helpful to improve patient counseling, optimize surgical planning and operating room efficiency, detect patients at risk of complications and change, when necessary, the operative technique.

In the present study, the pain was the predominant symptom seen in all 100 patients. All the 100 patients presented with chronic recurring pain. In 82% (82) of patients, the pain was in the right hypochondrium. Of the 82 patients, 72% (72) patients had a colicky type of pain, 28% (28) patients had a gripping type of pain, and 18% (18) patients had a dull aching type of pain with tenderness in right hypochondrium 80% (80), guarding 8% (8) and mass in 12% (12) [Table 1]. In a similar study by Reddy and Balamaddaiah in 2016,[3] 80% had pain in the right hypochondrium and among all patients undergone LC 44% and in converted to open 76% had pain in the right hypochondrium. In a study conducted by Goyal *et al.* in 2017,[4] 68% patient had pain in the right upper abdomen, of which 14% were difficult and converted to open cholecystectomy. In patients who had experienced pain within 2–4 months before hospitalization, this could have been due to pericholecystic inflammation-causing dense adhesion and subsequent conversion.

Fever was present in 12% (12) of the patients, which was of moderate degree and was associated with chills. In a study by Kassa and Jaiswal in 2017,[5] as a pre-operative factors, fever was found to be statistically significant factors for prediction of difficult LC ($P = 0.03$), while in another study by Khandelwal *et al*. in 2017,[6] 50% patient had a history of fever during attack among them 48% patient had difficulty during surgery while remaining 50% without a history of fever, only 2% had difficulty during LC.

In our study, patients with fever invariably associated with increased GB wall thickness and pericholecystic fluid collection; those patients had a difficult cholecystectomy; hence, fever is a strong predictor of difficulty.

General survey revealed that 54 (54%) patients had BMI <25, 22 (22%) had BMI in the range of 25–27.5, and 24 (24%) had BMI >27.5. In a study by Bunkar *et al*. in 2017,[7] BMI of patients was <25 in 26 (26%) patients; 25.1–30 in 60 (60%) patients; and >30 in 14 (14%) patients and BMI >30 was a significant predictor of difficulty. In a study by Mudgal *et al*. in 2018,[8] mean BMI for the patients undergoing a difficult LC was 30.96 ± 2.12 kg/m^2 while for those having an uneventful, LC was 25.40 (±2.57) kg/m^2 ($P < 0.001$). Mean BMI for patients undergoing conversion to OP was 32.00 ± 1.21 kg/m^2 while for those not having conversion was 26.71 (±3.34) kg/m^2 ($P < 0.001$). According to the present study obese, patients had a difficult cholecystectomy and BMI is a strong predictor and obesity associated with other comorbid conditions such as diabetes and hypertension.

In the present study, BMI >27.5 kg/m^2 shows a correlation with predicting difficult LC and conversion to open procedure ($P \leq 0.001$), which is in agreement with the previous studies [Table 2 and Graph 1].

In our study, all the 100 (100%) patients had stones in GB, 30 (30%) patients had wall thickening, and 20 (20%) had a pericholecystic fluid collection. As per our study, GB wall thickness and pericholecystic fluid collection are strong predictors of difficulty. The presence of pericholecystic fluid significantly increases the difficulty of visualization and the risk of local sepsis [Table 3 and Graph 2].

CONCLUSION

From the results of the present study, we concluded that various clinical parameters (pain, fever, vomiting, BMI, etc.) and ultrasonographic parameters are significant predictors of difficult LC. The conversion rate from LC to open cholecystectomy was 10%. These factors can predict difficulty to be encountered during surgery and help in making decision for conversion, thus shortening the duration of surgery and preventing unnecessary complications.

ACKNOWLEDGMENTS

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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Original Article

Role of Magnetic Resonance Imaging in Evaluation of Perianal Fistula

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Abstract

Introduction: Perianal fistula is an abnormal infected tract that connects the internal opening in the anal canal to the external opening in the perianal skin. It is an important cause of significant patient morbidity related to the lower intestinal tract. Magnetic resonance imaging (MRI) is the imaging modality of choice in the pre-operative assessment of perianal fistulas due to its excellent soft tissue resolution to accurately demonstrate the anatomy of the perianal region and the relationship of the fistulous tracts to the pelvic diaphragm and the ischiorectal fossae.

Aims and Objectives: This study aims to assess the role of MRI in evaluation of perianal fistula and to correlate the imaging findings with post-surgical data.

Materials and Methods: In this prospective study, 50 patients of all age groups with perianal fistulas were evaluated by MRI in the Department of Radiodiagnosis, Gandhi Medical College and Hamidia Hospital over a period of 1 year. MRI was performed on 1.5 Tesla Hitachi ECHELON SMART - 523 MRI machine using the required protocol and sequences. Fistulas were classified according to St James's University Hospital MRI classification system and imaging findings were compared with post-surgical data.

Results: MRI could detect the presence of fistula in all 50 patients, indicating 100% sensitivity. Most patients (68%) had internal opening on the posterior aspect of anal canal. Active fistulous tract was seen in 43 patients (86%) and chronic fibrosed tracts in 7 patients (14%). The most common type according to MRI grading was Grade I (54%), followed by Grade II (30%), Grade III (8%), and Grade IV (6%), respectively. MRI correctly described the type of fistula in 96% of cases.

Conclusion: This study concludes that MRI proved as a valuable imaging modality in evaluation of perianal fistula and should always be performed in patients before surgery.

Key words: Grading, Magnetic resonance imaging, Perianal fistula

INTRODUCTION

Perianal fistula is an abnormal infected tract that is lined with granulation tissue and connects the internal opening in the anal canal to the external opening in the perianal skin. It is an important cause of significant patient morbidity related to the lower intestinal tract.

Perianal fistulas are suspected to arise from infected anal glands that open into the anal crypts, as proposed by cryptoglandular hypothesis.[1] Risk factors include Crohn's disease, tuberculosis, and trauma during childbirth, pelvic malignancy, and radiation therapy.

Anal canal consists of internal and external sphincters to control the anal tone. The internal sphincter is involuntary and consists of smooth muscle. The external sphincter is voluntary and is composed of striated muscle. It is continuous with the puborectalis and levator ani muscles superiorly.

Imaging has an important role in the pre-operative assessment of perianal fistulas; various imaging modalities include conventional fistulography, computed tomography, endoanal ultrasound, and magnetic resonance imaging (MRI). MRI is the imaging modality of choice due to its excellent soft tissue resolution to accurately demonstrate the anatomy of the perianal region and the relationship of the

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fistulous tracts to the pelvic diaphragm and the ischiorectal fossae [Figure 1]. Site and direction of the fistulous tracts are illustrated by "the anal clock." When the patient is in lithotomy position, 12 o'clock is the anterior perineum, at 6 o'clock is the natal cleft, 3 o'clock refers to the left lateral aspect, and 9 o'clock to the right lateral aspect of the anal canal, which exactly corresponds to the axial MR images.

The purpose of our study was to assess the role of MRI in various types of perianal fistulas and compare the imaging findings with post-surgical data.

MATERIALS AND METHODS

This prospective study of 50 patients was conducted in the Department of Radiodiagnosis in collaboration with the Department of Surgery, Gandhi Medical College and Hamidia Hospital, Bhopal. The study was undertaken over a period of 1 year after taking written informed consent and brief history from all patients.

Inclusion Criteria

The following criteria were included in the study:

1. Patients presenting with perianal discharge
2. Patients of all age groups and both sexes.

Exclusion Criteria

The following criteria were excluded from the study:

1. Patients with contraindication for MRI such as metallic implants, cardiac pacemakers, aneurysmal clips, and cochlear implants
2. Patients with claustrophobia and who refused to give consent.

All patients were clinically examined and MRI pelvis with perineal region was performed on 1.5 Tesla MRI Hitachi ECHELON SMART - 523 machine with the help of dedicated surface coil. Patients were asked to lie in a supine position and scanned using MRI fistulogram protocol. Since the anal canal is tilted obliquely forwards, the field of view and scan extent were defined using a sagittal T2W single-shot image with the centerline along with the anal canal. The sequences obtained were T2W fat suppression

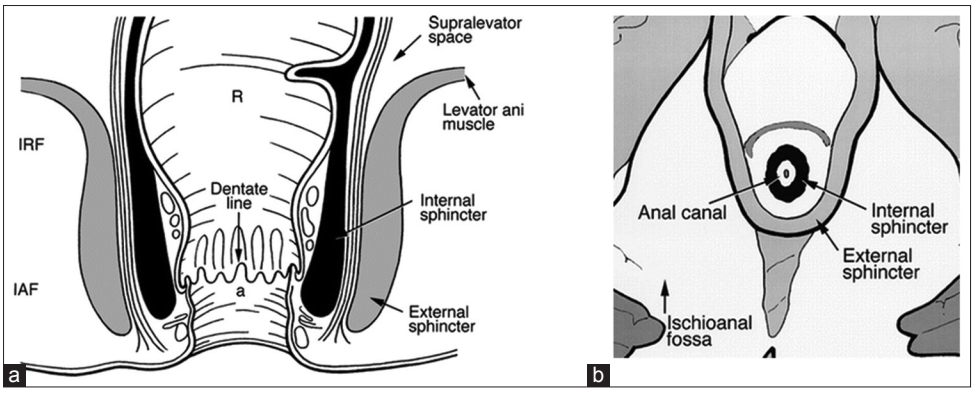

Figure 1: Schematic diagram in coronal (a) and axial plane (b) showing the anatomy of perianal region. a=anal canal, IAF=ischioanal fossa, IRF=ischiorectal fossa, R=rectum. (Source of image[1]=Reference no. 1, p. 3, Figure 2 and 3)

Table 1: Age distribution

Age groups (in years)	Number of cases	Percentage
1–10	1	2
11–20	4	8
21–30	11	22
31–40	18	36
41–50	9	18
51–60	6	12
61–70	1	2

Table 2: Gender distribution in patients with perianal fistula

Gender	Number of patients	Percentage
Male	37	74
Female	13	26

Table 3: Distribution of patients as per MRI grading of perianal fistula

MRI grade	Number of patients	Percentage
I	27	54
II	15	30
III	4	8
IV	3	6
V	0	0

MRI: Magnetic resonance imaging

Table 4: Distribution of patients as per internal anal canal opening

Internal opening	Number of patients	Percentage
Anterior	12	24
Posterior	38	76

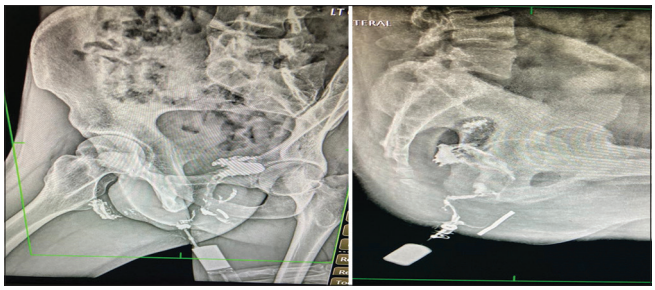

Figure 2: (a and b) Conventional fistulogram showing catheter introduced into the external opening with contrast extension in anal canal

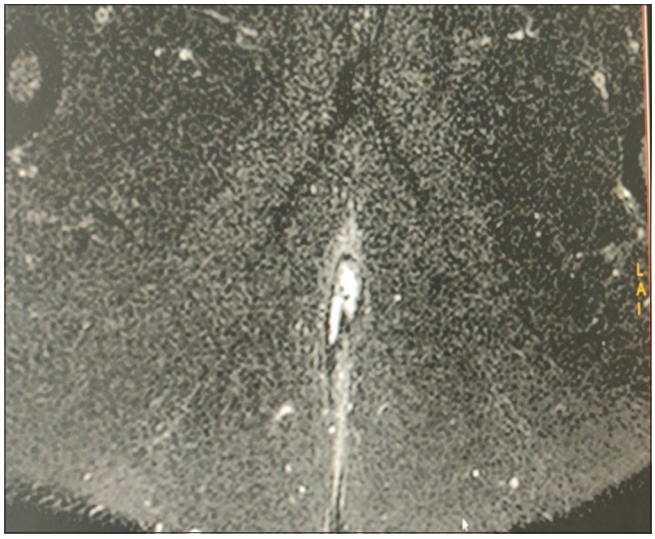

Figure 3: Case of intersphincteric fistula (magnetic resonance imaging Grade I) – axial T2 fat- saturated image showing internal opening on posterior aspect of anal canal

Table 5: Distribution of patients as per the number of internal anal canal openings

Number of internal openings	Number of patients	Percentage
Single	41	82
Multiple	9	18

sagittal and coronal oblique images (along with the long axis of anal canal), T2W axial, coronal oblique, and sagittal images, and T1W axial, sagittal, and coronal oblique images. As most patients had external opening, 5–10 ml of normal saline was introduced through it using a syringe and scan was taken subsequently. Contrast-enhanced T1W images were taken in selective patients to assess the degree of inflammation and differentiation of scarring and granulation tissue, especially in patients with pelvic surgery.

Scan images were subsequently analyzed and classified according to St James's University Hospital MR imaging classification system,[2] which is as follows:

- Grade I – Simple linear intersphincteric fistula

Figure 4: Coronal and axial images delineating fistulous tract traversing through external sphincter (magnetic resonance imaging Grade III), which appears iso- to hypointense on T1 (a) and hyperintense on T2 fat-sat images (b) and (c). (a) Coronal T1. (b) Coronal T2 fat-sat. (c) Axial T2 fat-sat

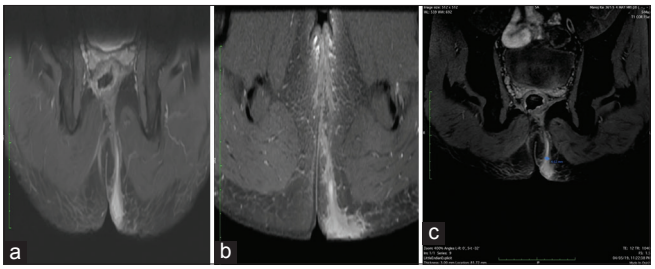

Figure 5: Series of images (a-c) showing case of active intersphincteric fistula with ramifications (magnetic resonance imaging Grade II). Fistula tract is showing enhancement in T1 post-contrast image (c). (a) T2 coronal fat-sat. (b) Axial T2 fat-sat. (c) Coronal T1 post-contrast fat-sat

- Grade II – Intersphincteric fistula with intersphincteric abscess or secondary fistulous track
- Grade III – Transsphincteric fistula
- Grade IV – Transsphincteric fistula with abscess or secondary track within the ischioanal or ischiorectal fossa
- Grade V – Supralevator and translevator disease.

Post-operative data of patients were collected and correlated with imaging findings.

RESULTS

- In our study of 50 cases with perianal fistulas, the most common age group affected was from 31–40 years (36%) with the mean age of 37.52 years [Table 1]
- There was a male predominance with 37 cases (74%) and females were 13 (26%) [Table 2]
- The most frequent clinical presentation was discharge seen in about 38 patients (76%), and rest 12 patients (24%) complained of pain in the perianal region
- Most common type, according to MRI grading, was Grade I (54%), followed by Grade II (30%), Grade III

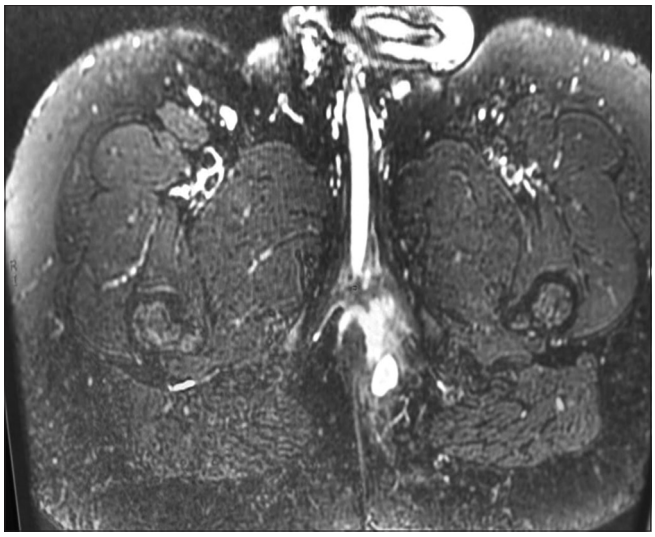

Figure 6: Axial T2 fat-sat image showing case of horseshoe type of fistula, tract is seen crossing from one side to another

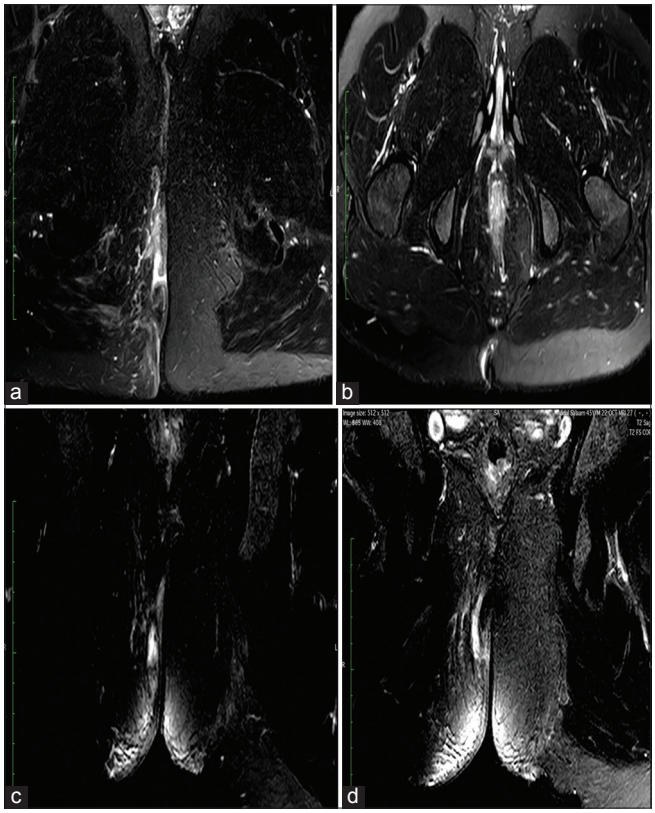

Figure 7: Series of T2 fat-sat axial and coronal images (a-d) showing case of intersphincteric fistula, magnetic resonance imaging Grade I

(8%), and Grade IV (6%), respectively. No case of Grade V was observed in our study [Table 3]

- Internal opening of fistula was commonly seen on the posterior aspect of anal canal in 76% of the cases [Table 4]
- Most of the cases (82%) had single internal opening into the anal canal [Table 5]

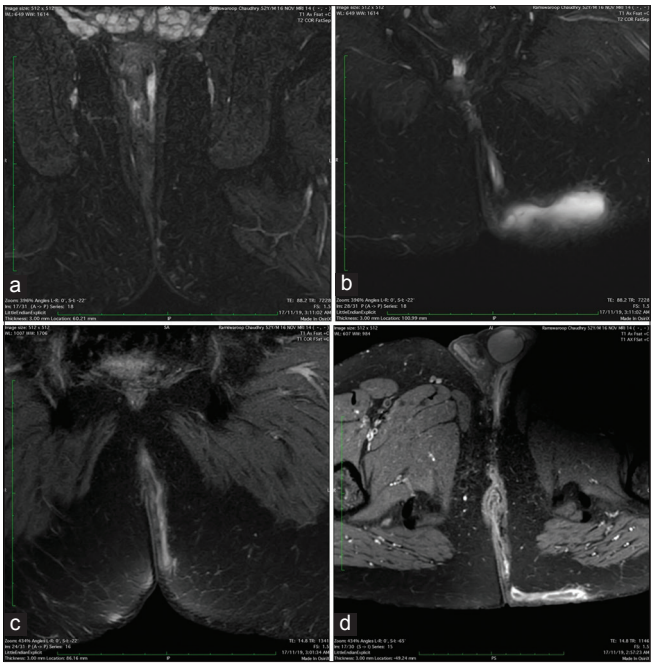

Figure 8: Series of images showing transsphincteric fistula (a) with abscess formation (b) and enhancement of the wall of the fistulous tract seen in post-contrast T1 fat-sat images (c and d), magnetic resonance imaging Grade IV. (a) T2 coronal fat-sat image at the level of anal sphincters. (b) T2 coronal fat-sat image at the level of gluteus muscles. (c) Coronal T1 post-contrast fat-sat image. (d) Axial T1 post-contrast fat-sat image

- Active fistulous tracts were seen in 43 patients (86%) and chronic fibrosed tracts in 7 patients (14%)
- In our study, MRI detected the presence of fistulous tract in all 50 patients, indicating 100% sensitivity; however, it could detect the correct type in 48 patients (96% of cases) when compared with post-surgical findings.

DISCUSSION

In our prospective study on 50 patients with perianal fistulas, we observed that middle-aged people were most commonly affected, with male-to-female ratio of 2.8:1. In the previous study done by Morris *et al.*,[1] the ratio was approximately 2:1, which was similar to our result. The reasons for this discrepancy are likely to be social or cultural rather than medical, as females tend to feel embarrassed about this disease and try to conceal it.

Before the advent of MRI, conventional fistulograms were used for the evaluation of perianal fistulas which involved cannulation of the external opening and injection of a water-soluble contrast into the external opening of fistula [Figure 2]. However, conventional fistulograms fail to delineate the sphincter complex and secondary tracks, so are of limited use.

On MRI, we observed that T1-weighted images without contrast enhancement were noted to provide a good

anatomical depiction of the levator ani, internal and external sphincters, and the ischioanal fossa.

Out of 50 patients, 12 patients (24%) had the internal opening anteriorly and 38 patients (76%) posteriorly [Figure 3]. This is similar with earlier studies done by Halligan and Stoker[3] which stated that fistulous tracts originating posterior to the transverse anal line are seen most frequently which may be due to the predominance of posterior anal gland infection.

Active fistulous tracts appeared hypointense on T1- and hyperintense on T2-weighted images (best visualized with fat saturation) relative to the muscle. Fluid within the lumen of the tract accounts for the T2-weighted hyperintensity [Figure 4]. Fistulous tracts were best visualized in fat-saturated T2-weighted sequences because fluid, granulation tissue, and pus appeared hyperintense against the low signal intensity of the suppressed fat, making them more conspicuous. Similar observations have been made in the previous studies[4] as well. Walls of the active tracts showed post-contrast enhancement [Figure 5]. Inactive tracts appeared hypointense on both T1- and T2-weighted images and lacked contrast enhancement, which is attributed to fibrotic changes and subsidence of surrounding inflammation.

In our study, active fistulous tracks were seen in 43 patients (86%) and chronic fibrosed tracts in 7 patients (14%). Secondary tracts/ramifications were seen in 18 cases (36%) which appeared hyperintense on T2/short inversion time inversion recovery (STIR) images and showed post-contrast enhancement. We encountered a case of horseshoe type of fistula, in which ramifications in intersphincteric fistula crossed from one side to the other [Figure 6].

Exact course relative to the sphincters, levator ani muscle, and overlying skin was reported, as it decides the post-surgical outcomes of the patients.

The incidence of intersphincteric (Grade I) fistulas was the highest in our study [Figure 7], accounting for 54% of cases. Morris *et al.*[1] and Parks *et al.*[5] also reported intersphincteric fistulas as the most common type in their studies.

Perianal abscesses along a fistula track were seen in 5 (10%) patients and typically had a central hyperintense signal on T2-weighted and STIR images corresponding to pus, with isointense signal in the wall [Figure 8]. The abscesses showed peripheral rim enhancement with hypo- or isointense contents on post-contrast T1-weighted images. Similar imaging findings were seen in the study done by Torkzad and Karlbom[6] and Mendoza *et al.*[7]

Surgical follow-up of all 50 patients was carried out. MRI could detect the presence of fistulous tract in all 50 cases. Thus, the sensitivity of MRI to detect the presence of fistula was 100%. MRI could detect the correct type in 48 patients (96% of cases). Two cases which were reported as intersphincteric fistula, turned out to be transsphincteric when correlated with surgical findings. Beckingham *et al.*[8] reported the sensitivity of 97% of MRI to detect perianal fistulas.

CONCLUSION

We diagnosed a wide spectrum of MR findings in patients with various types of perianal fistulas with higher sensitivity and accuracy when compared with post-surgical findings. MRI is the modality of choice for the evaluation of perianal fistulas, especially when surgical treatment is required, as it provides detailed information on the tract anatomy, its relationship to the sphincters and surrounding structures. It can also identify abscess formation and active infected tracts, which have profound impact on the subsequent clinical treatment.

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Original Article

A Clinical Study on Role of Coronary Computed Tomography Angiogram in the Diagnosis of Coronary Artery Disease

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Abstract

Background: In the recent past, cardiac computed tomography (CT) angiography is being performed for the diagnosis and treatment of coronary artery disease (CAD) and congestive heart failure. The differentiation of ischemic from non-ischemic cardiomyopathy, characterization of hypertrophic cardiomyopathy, and delineation of congenital heart defects are its primary diagnostic applications.

Aim of the Study: The aim was to study the clinical applications of coronary CT angiography (CCTA) in patients with suspected CAD and identify factors that affect CCTA findings.

Materials and Methods: Two hundred and fourteen patients diagnosed with CAD were included in the study. Patients aged between 36 and 76 years were included. Patients with chest trauma and prior thoracic surgery (coronary stenting or coronary artery bypass grafts) were excluded. Demographic data of the patients were recorded including age, gender, blood pressure, body mass index, smoking habits, intake of alcohol, previous history of angina, diabetes, and hypertension were recorded. The duration of symptoms was classified into five groups: <1 week, 1 week to 1 month, 1–3 months, 3–6 months, and more than 6 months. All the patients were investigated with lipid profile, serum creatinine, and blood glucose levels. All the patients were subjected to CCTA. The percentage of abnormal CCTA was observed and recorded. Abnormality of coronary arteries was expressed as atherosclerotic changes identified on CCTA scans, which is reflected in either an involvement of the right coronary artery (RCA), or the left coronary artery (LCA), or both of RCA and LCA. Significant coronary stenosis indicates that more than 50% lumen stenosis due to the presence of plaques was considered.

Observations and Results: Two hundred and fourteen patients with diagnosed CAD were included in the study, aged between 36 and 76 years. The mean age was 56 ± 2.10 years. There were 153 (71.49%) males and 61 (28.50%) were female, with a male-to-female ratio of 3.44:1. The youngest patient was aged 37 years and the eldest patient was 75 years with a mean age of 56 ± 2.10 years. There were 114/214 (53.27%) patients with abnormal CCTA scans and among them 84/114 (73.68%) were male and 30/114 (26.31%) were female. The most common symptom of presentation was pain in the chest elicited in 139 (64.95%) of the patients in this study, followed by history of hypertension in 89 (41.58%) patients. It was observed that there was no significant difference in the percentage of abnormal CCTA findings between male and female patients (P = 0.19), (with P value taken as statistically significant at <0.05). Similarly, no significant difference was found between the sex (male/female) and duration of symptoms (P = 0.71).

Conclusions: CCTA is a non-invasive, outpatient-based procedure suitable in patients without actionable CAD, obviating unnecessary invasive examination of coronary vessels. CT angiography findings are directly related to patient age and duration of symptoms, with increased abnormal findings reported in elderly population with the duration of symptoms more than 6 months. Moreover, there was a direct correlation between the involvement of coronary arteries and the patient age.

Key words: Angiogram, Computed tomography scan, Coronary computed tomography scan and myocardial infarction, Coronary

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INTRODUCTION

In view of rapid technical improvements in coronary computed tomography (CT) imaging, allowing large number of slices at a very rapid rate with high spatial resolution, its use in the recent times in the diagnosis of cardiovascular disease is possible. CT angiography (CTA)

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is being used as the first line of investigative procedure in patients with stable chest pain, first-time angina, and typical and atypical angina patients.[1-3] It is also being used as a first-line modality in the early diagnosis of abdominal aortic aneurysm, aortic dissection, and pulmonary embolism.[4-6] Coronary CTA (CCTA) now is being used as a standard clinical assessment for patients with low-to-intermediate pre-test probability for coronary artery disease (CAD).[7,8] CCTA can also be used as a follow-up in the patients who have undergone endovascular stents and stent grafts with the aim of determining stent and stent-graft patency and stent graft-related complications.[9,10] Prospective Multicenter Imaging Study for Evaluation of Chest Pain with $n = 10{,}003$, Scottish CT of the heart with $n = 4{,}146$, have established that CCTA is at least as effective as strategies that do not utilize CCTA for all studied cardiovascular outcomes.[11,12] In few randomized controlled imaging-guided trials, CCTA has been consistently associated with reduced incident myocardial infarction (MI) in both acute and stable chest pain populations.[13] In another meta-analysis of randomized trials, stable chest pain patients who underwent coronary CCTA were noted to have a 31% lower risk for MI (pooled risk ratio: 0.69; 95% confidence interval: 0.49–0.98).[13] Recently introduced capabilities for CCTA are fractional flow reserve CT and effective dose reduction through iterative reconstruction. In this context, the present study was conducted to study the clinical applications of CCTA in patients with suspected CAD and identify factors that affect CCTA findings.

Type of Study

This was a prospective cross-sectional and analytical study.

Duration of Study

The study was conducted from October 2015 to October 2018.

Institute of Study

The study was conducted at Al Azhar Medical College and Super Speciality Hospital, Thodupuzha, Kerala, India.

MATERIALS AND METHODS

Two hundred and fourteen patients diagnosed with CAD attending the Departments of General Medicine and Radiology of Al Azhar Medical College Hospital were included in the study. Patients aged between 36 and 76 years were included. An ethical committee clearance was obtained before the commencement of the study. An ethical committee approved consent form was used for the study.

Inclusion Criteria

1. Patients aged between 36 and 76 years were included
2. Patients with CAD were included
3. Patients presenting with chest discomfort as an isolated symptom were included
4. Patients with hypertension or diabetes with suspected CAD were included.

Exclusion Criteria

(1) Patients with ages below 36 and above 76 were excluded. (2) Patients with chest trauma, prior thoracic surgery (coronary stenting or coronary artery bypass grafts) were excluded. Demographic data of the patients were recorded including age, gender, blood pressure, body mass index, smoking habits, intake of alcohol, previous history of angina, diabetes, and hypertension were recorded. The duration of symptoms was classified into five groups: <1 week, 1 week–1 month, 1–3 months, 3–6 months, and more than 6 months. All the patients were investigated with lipid profile, serum creatinine, and blood glucose levels. All the patients were subjected to CCTA. All CT scans were performed on a 64-slice CT scanner (GE Medical Systems, Light speed VCT, 64 × 0.625 mm) with the following protocols: beam collimation 0.625 mm, pitch 0.18, reconstruction interval of 0.625 mm, with tube voltage of 120 kV, and tube current ranging from 300 mAs to 650 mAs (tube current modulation). Contrast medium (Iopamiro, 370, 60–80 mL) was injected into the antecubital vein at 5 mL/s, followed by 30 mL of saline chasing at 3 mL/s, and the scan was performed with a bolus tracking technique with a CT attenuation of 250 HU as the triggering threshold at the ascending aorta to initiate the scan. Axial images were reconstructed with a slice thickness of 0.625 mm in 0.625 mm increment resulting in isotropic volume data with a voxel size of 0.625 mm × 0.625 mm × 0.625 mm. A retrospective electrocardiographic-gating protocol was used in all patients to acquire the volume data achieving a temporal resolution of 175 ms in the center of the gantry rotation. Most volume data were reconstructed at 70–80% RR interval to minimize artifacts. In some patients, the volume data were reconstructed at 45% RR interval to acquire better image quality of the right coronary artery (RCA) and at 75% RR interval to better demonstrate the left anterior descending artery. For patients with a heart rate more than 70 beats/min, a beta-blocker was used to slow down the heart rate. The percentage of abnormal CCTA was observed and recorded. Abnormality of coronary arteries was expressed as atherosclerotic changes identified on CCTA scans, which is reflected in either an involvement of the RCA, or the left coronary artery (LCA), or both of RCA and LCA. The involvement of LCA includes abnormal changes to the left main stem, left anterior descending, and left circumflex as well as side branches, whereas the involvement of both RCA and LCA refers to

abnormal changes at both of these arteries including side branches. Significant coronary stenosis indicates more than 50% lumen stenosis due to the presence of plaques.

OBSERVATIONS AND RESULTS

Two hundred and fourteen patients diagnosed with CAD attending the Departments of General Medicine and Radiology of Al Azhar Medical college hospital were included in the study. They were aged between 36 and 76 years. The mean age was 56 ± 2.10 years. There were 153 (71.49%) males and 61 (28.50%) were female, with a male-to-female ratio of 3.44:1. The youngest patient was aged 37 years and the eldest patient was 75 years with a mean age of 56 ± 2.10 years. There were 114/214 (53.27%) patients with abnormal CCTA scans, and among them, 84/114 (73.68%) were male and 30/114 (26.31%) were female. The most common symptom of presentation was pain in the chest elicited in 139 (64.95%) of the patients in this study, followed by history of hypertension in 89 (41.58%), diabetes mellitus in 39 (18.22%), and tachycardia in 28 (13.08%), and 16/214 (07.47%) had dizziness as the initial symptoms. Abnormal CCTA findings corresponding to the age of patients, gender, and duration of symptoms were observed in this study. It was observed that there was no significant difference in the percentage of abnormal CCTA findings between male and female patients ($P = 0.19$), (with P value taken as significant at <0.05). Similarly, no significant difference was found between the sex (male/female) and duration of symptoms ($P = 0.71$), [Table 1].

Out of 204 CCTA investigations done, 114 (53.27%) were found to be abnormal. Out of which, 8 (03.73%) were abnormal in the age group of 36–45 years, followed by 24 (11.21%) in the age group of 46–55 years, 35 (16.35%) in the age group of 56–65 years, and 47 (21.96%) were abnormal for the age group of 66–75 years [Table 2]. Fifty percent or more of the patients in the age groups between 46 and 75 years had abnormal CCTA findings which was statistically significant with $P = 0.013$ [Table 2].

The highest abnormal rates of coronary involvement of LCA, RCA, and RCA/LCA were noticed in the age group over 66 years (47/76, 61.84%), followed by 56–65 years' age group with abnormal CCTA in 35 out of 61 patients (57.37%). In the youngest age groups of 36–45 and 46–55 years, the incidence was 32 out of 77 patients (41.55%). There was a correlation between the involvement of coronary arteries and the increasing age of the patients; the P value was 0.031 ($P < 0 = 0.05$) [Table 2]. The occurrence of significant stenosis was observed in 21/76 (27.63%) of the patients in the age group of 66–76 years, followed by 13/61 (21.31%). Only 9/48 (18.75%) and 2 out of 29 (18.75%) patients aged 46–55 years and 36–45 years, respectively, were found to have stenosis changes in their CCTA investigation [Table 2].

DISCUSSION

In the present study, CCTA was undertaken as an investigation in patients with suspected CAD, presenting with complaints of pain in the chest, tachycardia, hypertension, and diabetes mellitus. There were 114/214 (53.27%) patients with abnormal CCTA scans, and among them 84/114 (73.68%) were male and 30/114 (26.31%) were female. The review of literature showed that the majority of studies (with the exception of the coronary evaluation using

Table 1: The incidence of CCTA abnormalities in both genders depending upon the duration of symptoms (*n*=214)

Duration of symptoms	Total	Abnormal number-114	Male/ Female	RCA Abnormal change	LCA Abnormal change	RCA/LCA Abnormal change	No of significant stenosis
<1 week	06	01	01/0	02	01	03	02
1 week to 1 month	11	06	04/02	01	03	02	04
1-3 months	34	23	14/09	02	11	10	11
3-6 months	68	39	24/15	05	22	12	23
>6 months	95	45	31/26	07	23	15	29

CCTA: Coronary computed tomography angiography, RCA: Right coronary artery, LCA: Left coronary artery

Table 2: The Coronary CT angiography findings in patients with suspected coronary arterial disease (*n*=214)

Age groups	Total	Abnormal number	Male/ Female	RCA Abnormal change	LCA Abnormal change	RCA/LCA Abnormal change	No of significant stenosis
36-45	29	08	22/07	0	06	2	02
46-55	48	24	37/12	05	13	06	09
56-65	61	35	47/14	07	13	15	13
66-76	76	47	59/17	10	21	16	21

CCTA: Coronary computed tomography angiography, RCA: Right coronary artery, LCA: Left coronary artery

multidetector spiral CTA using 64 Detectors [CORE 64] study) indicate that a negative CCTA can effectively rule out obstructive CAD.[14] In a meta-analysis,[15] of similar studies with 64-slice CT scanner, CCTA showed a sensitivity of 99% and negative prediction value (NPV) of 100% for patient-based detection of significant CAD. However, the specificity has been lower than the sensitivity in most studies, and false-positive results are possible, particularly in patients with high calcium scores.[16] Out of 204 CCTA investigations done, 114 (53.27%) were found to be abnormal. Out of which, 8 (03.73%) were abnormal in the age group of 36–45 years, followed by 24 (11.21%) in the age group of 46–55 years, 35 (16.35%) in the age group of 56–65 years, and 47 (21.96%) were abnormal for the age group of 66–75 years [Table 2]. Fifty percent or more of the patients in the age groups between 46 and 75 years had abnormal CCTA findings which was statistically significant with $P = 0.013$ [Table 2]. In the Assessment by Coronary Computed Tomographic Angiography of Individuals Undergoing Invasive Coronary Angiography (ACCURACY) which was a prospective multicenter trial of patients with chest pain without known CAD and intermediate disease prevalence, 64-slice CCTA had a patient-based sensitivity of 94% and a specificity of 83% in detecting stenosis of 70% or greater (comparable values were seen at a 50% stenosis level). Unlike, the previous study patients with high calcium scores were not excluded from this study. Calcium scores (Agatston score) >400 reduced specificity significantly. The net predictive value (NPV) of CCTA was 99%,[17] whereas in a CORE trial, 64 prospective multicenter trial of patients with suspected symptomatic CAD referred for conventional coronary angiography (CCAG), 64-slice CCTA had a patient-based sensitivity of 85% and specificity of 90% (excluding patients with a calcium score greater than Agatston score of 600) for detecting stenosis 50% or greater. However, the NPV of 83% in this study was lower than in other studies.[18] In a 2008 meta-analysis, the sensitivity was highest in the left main artery and lowest (85%) in the circumflex artery.[16] In a systematic review that evaluated the diagnostic accuracy of CCTA for detecting cardiac allograft vasculopathy (CAV) compared with CCAG alone or with intravascular ultrasound, Wever-Pinzon *et al.* found that CCTA had high sensitivity, specificity, and NPV for the detection of any CAV and significant CAV.[19] Three aspects of the present study are worth notable. They are: (1) the abnormal CCTA findings in patients with suspected CAD are directly related to the age group which indicates that CCTA should be selectively recommended for imaging elderly patients presenting with chest discomfort. (2) The abnormal symptoms of patients are closely related to the abnormal CCTA findings, especially in those with complaints for more than 6 months. (3) There was a direct correlation between abnormal CCTA images and patient age group, with patients aged over 65 years found to have abnormal changes, including significant stenosis to the LCA, RCA and RCA/LCA, and higher rates than any other age group.

CONCLUSIONS

CCTA is a non-invasive, outpatient-based procedure suitable in patients without actionable CAD, obviating unnecessary invasive examination of coronary vessels. CTA findings are directly related to patient age and duration of symptoms, with increased abnormal findings reported in the elderly population with the duration of symptoms more than 6 months. Moreover, there was a direct correlation between the involvement of coronary arteries and the patient's age. However, use of CCTA in the diagnosis of patients with suspected CAD needs to be justified clinically, since a low percentage of positive results are reported in younger patients. Further studies with the inclusion of clinical predictive outcomes should be conducted to verify our preliminary results.

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Original Article

A Study of Clinical Profile of Headache in Epilepsy Patients

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Abstract

Background: Headache is the most common symptom encountered in neurology outpatient department (OPD). One-fifth of patients in neurology clinics present with headache. Headache was long been found to be associated with epilepsy, especially migraine both chronic neurologic disorders share possible clinical interrelationships. Studying their association is necessary as identification of clinical subgroups vulnerable to develop to both disorders can be made possible in the future.

Aims and Objectives: The objective of the study was to analyze the characteristic features of various types of headaches in epilepsy patients and their causal association.

Materials and Methods: A total of 100 epilepsy patients with headache were recruited from the OPD of the neurology department in a tertiary care center and interviewed regarding the characteristic features of headache through a questionnaire.

Results: Out of our study population, female outweighs the male (53, 47). Out of all, interictal was more prevalent (57%), followed by post-ictal (48%), pre-ictal (22%), and intra-ictal (0%) among epilepsy patients. Migraine was found to be the most common type of headache in all subgroups of headaches in epilepsy patients (pre-ictal – 77% of migraine, postictal – 81% of migraine, and interictal – 61% of migraine). Associated characters of headaches such as photophobia (42%) and their prevalence are also studied.

Conclusions: Stronger association between migraine and headache is validated, and the strongest associated with migraine in postictal headache is highlighted (81%). This can strengthen the theories proposed so far such as the frequent triggering of headache by a seizure. Further research on common etiologic or pathophysiological processes to these associations can lead to a common therapeutic strategy and prevention of morbidity in patients.

Key words: Epilepsy, Headache, Interictal headache, Migraine, Post-ictal, Pre-ictal headache, Tension-type headache

INTRODUCTION

Headache is the most common neurologic symptom prevalent among the general population. Epilepsy is the most common neurologic disorder affecting all age groups.[1] The existence of primary headaches in epilepsy patients is still a topic of debate.

Headache occurring in epilepsy patients can be classified broadly as interictal headache (inter –IH) and peri-ictal headache (peri – IH). Peri-ictal headache is again classified as pre-ictal, intraictal, and postictal headache according to its relationship with seizures.[2]

According to the International Classification of Headache Disorders (ICHD),[3] pre-ictal headache is defined as an episode that developed within 24 h before the seizure and lasting until the start of the seizure. Intraictal headache is defined as an episode of headache occurring simultaneously with the onset of seizure ipsilateral to the epileptic discharges. This occurs more commonly with partial seizures. Hemicrania epileptica is a terminology used interchangeably with intraictal headache in the ICHD.[3,4] Post-ictal headache is defined as an episode that has developed within 3 h after a seizure but resolved within 72 h after the epileptic seizure is terminated.

Interictal headache is defined as an episode which not started within 3 h after an epileptic seizure or never

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proceeding directly into an epileptic fit. Migraine is found to be the most common interictal headache among epilepsy patients according to various studies.[5] Studying the prevalence of interictal and peri-ictal headache, and it's characteristic features help us to find out the casual association between headache and epilepsy.

Aim

The aim of the study was to analyze the characteristic features of various types of headaches in epilepsy patients and their causal association.

MATERIALS AND METHODS

This study was done in a tertiary care hospital in the Southern Tamil Nadu state of India. All patients attending the neurology outpatient department in our tertiary care hospital with the diagnosis of epilepsy between November 1, 2019, and December 31, 2019, were recruited in this study.

All patients who are included in this study are more than 18 years and satisfy the inclusion criteria, already a known case of seizure disorder on treatment with a history of headache. Patients <18 years, who are unwilling to participate in the study, never suffered a headache, with mental retardation, other behavioral or learning disorders, and patients presented with the first episode of seizures are excluded from this study.

A questionnaire was prepared, and all patients included in this study were interviewed after getting informed written consent. The questions about the nature of the headache in the questionnaire were based on the ICHD-II criteria.[3,6] The patients were asked about the type of headache, its temporal relationship with seizures, duration of headache, the intensity of pain, frequency, lateralization, quality of pain, aggravating factors, relieving factors, and use of analgesics by the patient during the episode. All these modalities were described for all types of headaches experienced by the patients (pre-ictal, post-ictal, and interictal). The presence of accompanying features such as photophobia, phonophobia, vomiting, nausea, and other aura symptoms is asked and recorded. According to the ICHD-II criteria,[3] the patient's headache was typed as migraine, tension-type headache (TTH), and unclassifiable. Details of seizures such as semiology (generalized tonic-clonic seizures [GTCS], complex partial seizures [CPS], myoclonic, and atonic), duration of illness, frequency, and type of treatment were also collected from the patient. All patients underwent electroencephalogram after the interview and reports were collected.

Association of headache with epilepsy and it's various characteristic features are compared with the clinical profile of epilepsy patients through statistical analysis.

RESULTS

Out of 100 patients included in our study, 47 were males and 53 were females Figure 1. The study population falls in the age group of 19 years–71 years. The mean age among males was 38.9 years and females were 35.6 years. The duration of illness among our study population ranges from 1 year–45 years. Among our study group, ten patients had CPS; the rest of the 90 patients had GTCS Figure 2. Among our study group, 31 patients are taking mono drug therapy (antiepileptic medications), 53 patients are found to take dual drug therapy, and 16 patients are taking multidrug therapy Figure 3.

Pre-ictal Headache

Among our study group, 22 patients were found to have pre-ictal headaches Figure 4. Out of 22 patients,

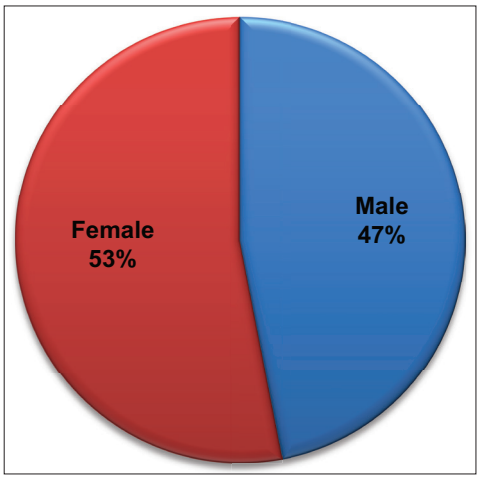

Figure 1: Sex distribution among our study population

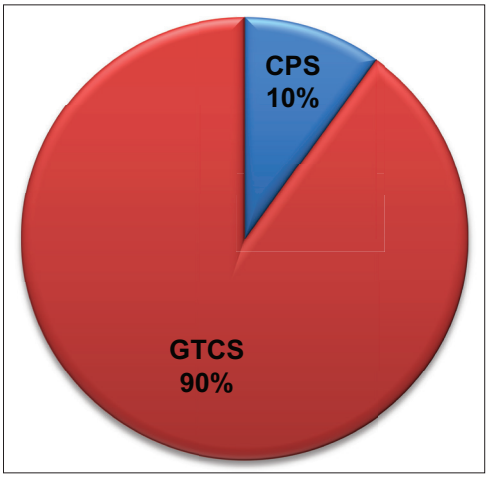

Figure 2: Distribution of semiology of seizures

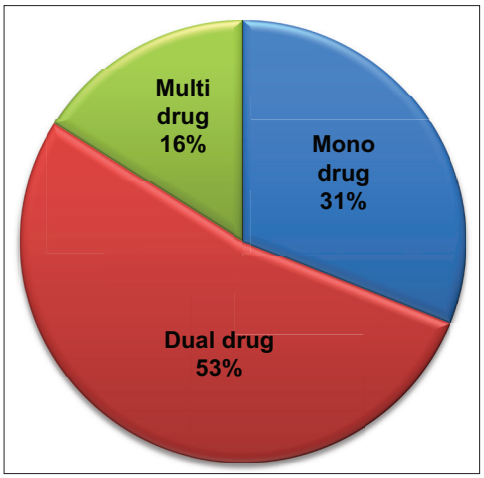

Figure 3: Distribution of patterns of therapy among our study group

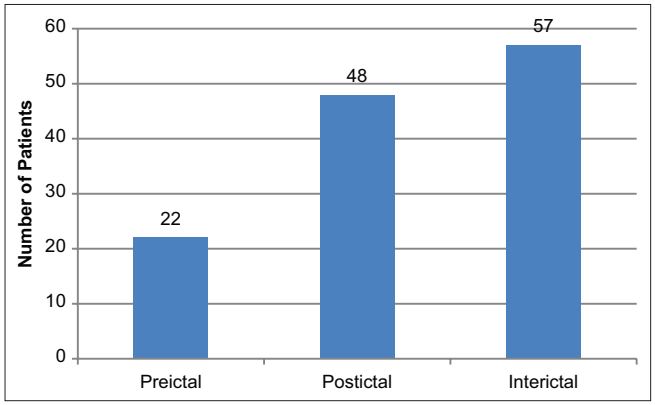

Figure 4: Distribution of various headaches among epilepsy patients in our study group

19 patients had a headache for <1 h before seizure onset, and three patients suffered from headache for 1–3 h before seizures. Seventeen patients had headache of migrainous type and other unclassifiable types in five patients. Out of 22 patients, 11 patients also had a headache during the interictal period also. Among these, 11 patients who have both pre-ictal and interictal attacks of headache, nine patients (9/11) had resembled the same quality of pre-ictal and interictal headache with the migrainous feature, whereas other two patients (2/11) headache were unclassifiable. Among patients with pre-ictal headache, 18 patients (18/22) were known to have GTCS and four patients were known to suffer from CPS (4/22).

Postictal Headache

Of our study population, 48 patients were found to have post-ictal headache. Out of 48 patients, 26 patients (26/48) had headache for <24 h duration from seizure termination and 22 patients had headache for more than 24 h duration (22/48). Among patients having post-ictal headache, 39 (39/48) had features of migrainous type and 9 (9/48) patients had features of TTH, out of these 48 patients, 16 patients also headache during the interictal period (16/48). Among the 16 who are found to have both post-ictal and interictal headache, eight patients had migrainous type (8/16), seven had TTH type (7/16), and one patient had the unclassifiable type of interictal headache (1/16). Nausea (15/48) was found to be the common accompanying feature in postictal headache, followed by vomiting (13/48), photophobia (10/48), and myalgia (5/48), respectively. Among 48 patients, 44 patients had GTCS and four patients had CPS as seizure semiology.

Interictal Headache

Among our study population, 57 patients had interictal headache. Among them, 35 patients had a migrainous type, 12 patients had TTH type, and ten had the unclassifiable type of headache. Females are more common among the migraine subgroup (28/35). Among our entire study population, two patients were found to have pre-ictal, post-ictal, and interictal headache episodes, with one being having migrainous type, and the other having TTH type of headache. Regarding characteristic features of interictal headache, 14 had unilateral headache and 27 had a bilateral headache. Unilateral headache was more commonly associated with migrainous type. Forty-eight patients use analgesics in addition to anti-epileptic medications during an episode of interictal headache for resolution of symptoms. Common associated features accompanying interictal headache are photophobia (24/57), followed by nausea (23/57), vomiting (17/57), phonophobia (8/57), and aura (8/57). Out of 57 patients, 52 of them were found to suffer from GTCS and five patients had CPS. Seventeen patients were taking monotherapy, 29 taking dual drug therapy, and 11 patients on multidrug therapy among these 57 patients with interictal headache. Among these patients with interictal headache, 24 patients were suffering from seizures for <5 years duration, nine patients for 6–10 years duration, and 24 patients had seizures for more than 10 years duration.

DISCUSSION

Study on association between headache and epilepsy is a topic of controversy due to differences in classification criteria, race, age, and sex differences among targeted population, the methodology of data collection among existing studies.[6]

Among our study population, the peri-ictal headache was present (pre-ictal 22%, and post-ictal 48%) in 35% of patients in accordance with other studies in the literature (28–50%).[7] The prevalence of pre-ictal headache was 22% in our study which was slightly higher when compared to other study designs Mainieri *et al.*[8]

Table 1: Correlation between postictal headache and migraine among our study population

Post-ictal	Post migraine		Total	*P*-value
	No	Yes		
No	52	0	52	<0.0001
Yes	9	39	48	
Total	61	39	100	

Table 2: Correlation between presence of pre-ictal headache and duration of epilepsy

Duration in years	Pre-ictal		Total	*P*-value
	No	Yes		
<5	36	10	46	0.667
6–10	15	6	21	
>11	27	6	33	
Total	78	22	100	

Table 3: Correlation between presence of post-ictal headache and duration of epilepsy

Duration in years	Post-ictal		Total	*P*-value
	No	Yes		
<5	22	24	46	0.73
6–10	12	9	21	
>11	18	15	33	
Total	52	48	100	

Table 4: Correlation between presence of pre-ictal headache and patterns of therapy for epilepsy

Treatment	Pre-ictal		Total	*P*-value
	No	Yes		
Mono drug	28	3	31	0.337
Dual drug	38	15	53	
Multidrug	12	4	16	
Total	78	22	100	

Table 5: Correlation between presence of post-ictal headache and patterns of therapy for epilepsy

Treatment	Post-ictal		Total	*P*-value
	No	Yes		
Mono drug	13	18	31	0.585
Dual drug	31	22	53	
Multidrug	8	8	16	
Total	52	48	100	

Table 6: Correlation between presence of interictal headache and semiology of seizures

Seizure type	Interictal		Total	*P*-value
	No	Yes		
Generalized tonic-clonic seizures	38	52	90	0.637
Complex partial seizures	5	5	10	
Total	43	57	100	

Table 7: Correlation between presence of interictal headache and duration of epilepsy

Duration in years	Interictal		Total	*P*-value
	No	Yes		
<5	22	24	46	0.675
6–10	12	9	21	
>11	9	24	33	
Total	43	57	100	

Table 8: Correlation between presence of interictal headache and duration of epilepsy

Treatment	Interictal		Total	*P*-value
	No	Yes		
Mono drug	14	17	31	0.585
Dual drug	24	29	53	
Multidrug	5	11	16	
Total	43	57	100	

Intraictal headache was not found in any patients in our study population. Even various studies in literature also consider that cases of epileptic headache (ictal headache) were rare and can be seen in children than in adults, as mentioned in Mainieri *et al.*[8] Moreover, the term epileptic headache is also not used in the current ICHD and International League Against Epilepsy (ILAE) classification. ILAE also consider ictal headache as a form of autonomic aura.

The most common among peri-ictal headache was post-ictal headache which accounts for 48% in our study population and incomparable with 12–52% other studies.[2,9-14] Migraine was the most common type of headache among post-ictal headaches, with significant $P < 0.0001$ Table 1 in accordance with other studies in the literature.[1,5] However, the duration of epilepsy and drug-resistant epilepsy (multidrug therapy) does not correlate with the presence of peri-ictal (pre-ictal, and post-ictal) headache Tables 2-5 ($P = 0.667$, 0.73, 0.337, and 0.585, respectively) in contrast with other studies in the literature.[15,16]

Interictal headache was more prevalent among epilepsy patients than peri-ictal headache, being found in 57% of patients among our study population. Migraine was the most common type accounting for 61% in accordance with 60% in a study by Wang *et al.*[14] TTH and unclassifiable type of interictal headache in epilepsy patients account for 21% and 17%, respectively. Semiology, duration of seizure, and presence of drug-resistant seizures do not correlate significantly with the occurrence of an interictal headache Tables 6-8 ($P = 0.637$, 0.675, and 0.585).

In total, the strong association of peri-ictal and interictal migrainous headache attacks and epilepsy was established in this study. Recent studies also support this association by various theories such as genetic and membrane channel theory.[17] Altered membrane channel creating between the imbalance of excitatory and inhibitory impulses in the brain leading to a common risk for both migraine and epilepsy. Cortical spreading depression is also found to be another pathophysiology underlying common to both epilepsy and migraine with aura.[17] Furthermore, studies suggest epilepsy can also occur as a stressful event triggering the occurrence of other headaches such as TTH.[18,19] Our study further validates this association with data and considering the common pathophysiology through various studies, treating these patients with common antagonistic drugs and alleviating the symptomatology can further prove the association further.

CONCLUSIONS

Interictal headache (57%) was the most common among our study population, followed by postictal headache (48%). Migraine was the common type of headache among all categories of peri-ictal and interictal headaches. The strong association of migraine among epilepsy patients and the high prevalence of interictal and post-ictal headache in epilepsy patients are established and strengthened by our study. Our study highlights that the presence of migraine and other types of headache during interictal and peri-ictal period should be anticipated in epilepsy patients and should be addressed early as ignoring can add to the morbidity of the patient.

Early anticipation of headache and proper simple measures like history taking can lead to early detection of this comorbidity in epilepsy patients. Early detection can influence the choice of antiepileptic drug; thereby selecting a common therapy leads to control of both epilepsy and headache reducing the morbidity and mortality among patients.

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Original Article

Study of Various Factors Which Influence the Outcome of Patients with Blunt Injury Chest

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Abstract

Introduction: Injury is the most common cause of death among people aged 1–34 years. The most common cause of injury is a road traffic accident and the majority is confined to the thoracic cage. These consist of rib fractures with underlying pulmonary contusion. When ignored, underestimated or inadequately treated chest injuries may cause the death of a patient during surgical intervention for seemingly more pressing intracranial or abdominal hemorrhage.

Aim: This study aims to study the outcome of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

Materials and Methods: A prospective review of all cases of trauma with blunt chest injuries evaluated with X-ray or computed tomography scan. The cases were examined for age, type of injuries, presence or absence of rib fractures, hemothorax, or pneumothorax.

Results: There were 50 patients included in this study. All had rib fractures and hemo/pneumothorax, 3 had lung contusion, 19 patients had associated injuries, 1 patient underwent emergency thoracotomy, 3 patients were kept on ventilator support, and 3 expired.

Conclusion: Close attention to improving gas exchange and early management of hemo/pneumothorax might improve outcomes in blunt injury chest.

Key words: Blunt injury, Management, Rib fractures

INTRODUCTION

Trauma-related mortality accounts for 9% of deaths in all age groups and most cases involve blunt injuries.[1,2] Multiple trauma is the main cause of disability and a major contributor to health cost approximately 16% of global medical expenses. Chest trauma is one of the most common injuries suffered by polytrauma patients with an incidence of 45–65% associated with a mortality rate of about 60%. Blunt trauma to chest in isolation is fatal in 10% of patients, rising to 30% in the presence of other injuries. Early deaths after thoracic trauma are due to hypoxemia, hypovolemia, and tamponade.[1-3] The first step in treating such patients should be to diagnose and treat these problems as early as possible because they may be readily corrected. Therefore, thoracic injury is important in the overall management of polytrauma patients requiring a longer stay in the intensive care unit (ICU) and the use of mechanical ventilation.[3-7] The present study analyzed the outcomes of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

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Aim

This study aims to study the outcome of blunt injury chest patients in emergency and various modalities of treatment to identify possible risk factors for mortality.

MATERIALS AND METHODS

The study included 50 patients who presented to the casualty with blunt injury to chest with rib fractures

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and significant hemo/pneumothorax requiring tube thoracostomy with or without associated injuries. The various modes of injury, various presentations, and the various factors associated with poor outcomes such as elderly patients, multiple rib fractures, first and second rib fractures, coexisting chronic lung disease, and flail chest have been evaluated. Stable patients have been evaluated with chest X-ray, ultrasonography abdomen and pelvis, and computed tomography chest for assessing various chest injuries and associated injuries. Unstable patients with clinical evidence of tension pneumothorax, tube thoracostomy has been done without waiting for X-ray chest. Simple rib fractures were managed with analgesics, antibiotics. The first and second rib fractures were evaluated for potentially serious injuries to the chest and other organs. Patients with lower rib fractures were evaluated for underlying abdominal visceral organs (spleen on left and liver on right). Patients with multiple rib fractures and flail chest were managed in the ICU and provided thoracic epidural analgesia and ventilator support.

RESULTS

There were 50 patients included in the study. Elderly patients, especially those with the pre-existing chronic pulmonary disease, have a higher risk. In this study, six patients were aged more than 60 years of whom one patient died. Fractures involving the first and second ribs are a definitive risk factor. In this study, two of the eight patients with fracture first or the second rib died with a mortality rate of 25%.

Flail chest is a serious injury. In this study, two patients had multiple rib fractures with a flail chest. With tube thoracostomy and ventilator support and thoracic epidural analgesia, one patient improved well. The other patient died.

The presence of lung contusion indicates serious chest injury and serious associated injuries. In this study, all three patients with lung contusion had serious chest and associated injuries.

In this study, five patients had associated head injury, three patients had spinal injuries, and nine patients had fracture bones of extremities and pelvis. Two patients died due to associated head and spinal injuries [Figure 1].

The various factors which adversely affect the outcome of a patient with blunt injury chest are flail chest, multiple rib fractures, first and second rib fractures, underlying lung contusion, and associated injuries to other vital organs. The most common cause of blunt injury chest is a road traffic accident [Figures 2 and 3].

Thoracic epidural analgesia gives good pain relief and improves survival in multiple rib fractures and flail chest patients [Figure 4].

Rib fractures with underlying hemo/pneumothorax can usually be managed effectively by tube thoracostomy.

All trauma patients should be managed by the steps of advanced trauma life support (ATLS).[8,9]

a. Primary survey with simultaneous resuscitation to identify and treat what is killing the patient
b. Secondary survey to proceed and identify all other injuries
c. Tertiary survey and definitive care.

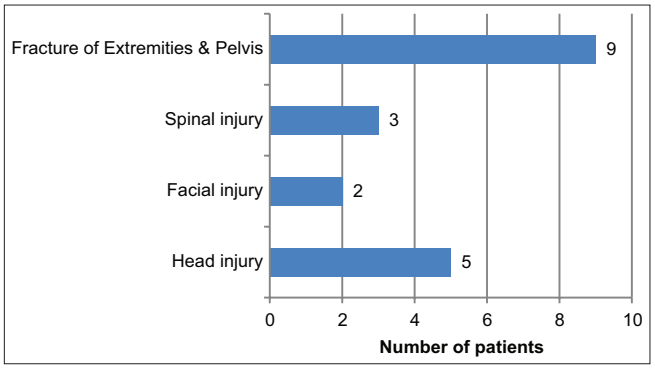

Figure 1: Distribution of associated injuries

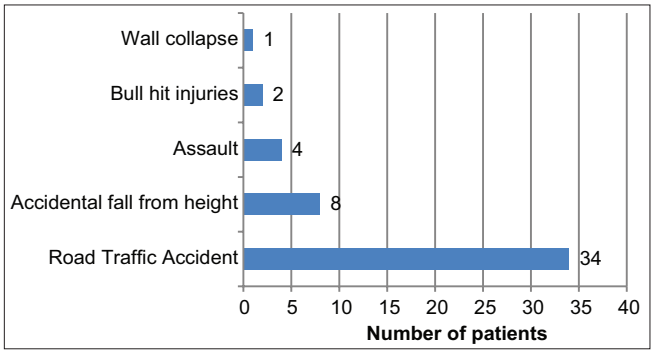

Figure 2: Distribution of mode of injury

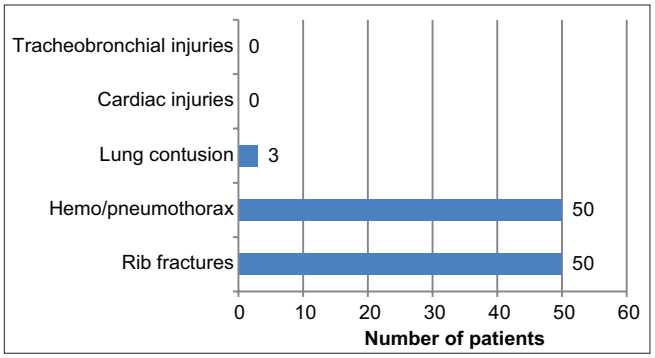

Figure 3: Distribution of clinical presentation

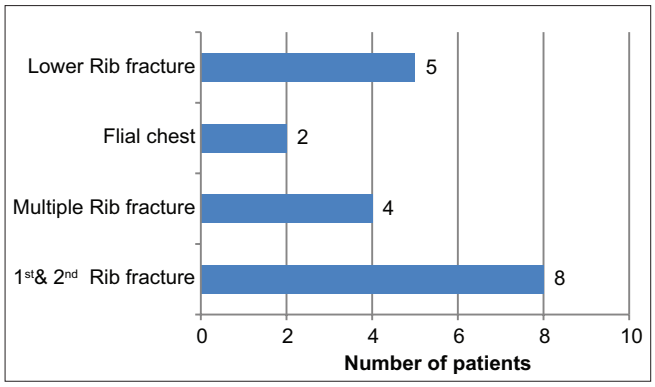

Figure 4: Distribution of rib fractures

Indications of thoracotomy

a. More than 1500 ml of blood drained on chest tube insertion
b. More than 300 ml/h of drainage for 3 consecutive h
c. Massive air leak associated with pneumothorax
d. Drainage of esophageal or gastric contents from the chest tube.

Flail chest patients should be managed aggressively by tube thoracostomy, oxygen, chest physiotherapy, thoracic epidural analgesia, and ventilator support if required.

Patients with a fracture of the first or second ribs should be evaluated carefully for a serious chest injury and serious injury to other vital organs.

DISCUSSION

Road traffic accidents (68%) are the most common cause of blunt injury chest, the next being falls from height (16%). Blunt trauma injuries predominantly affect male individuals (70%).[1-3]

About 10% increase in speed translates into 40% rise in case fatality risk for the occupants of the motor vehicle.[4] The use of seat belts reduces the risk of death or serious injury for front seat occupants by 45%. Helmets reduce the risk of fatal head injury by about one-third and facial injury by two-thirds among persons who ride two-wheelers. Avoiding alcohol before driving is an important preventive step.[4,5,10]

In the management of polytrauma patients, the following steps in the ATLS philosophy should be followed.[8]

a. Primary survey with simultaneous resuscitation to identify and treat what is killing the patient
b. Secondary survey to proceed and identify all other injuries
c. Tertiary survey and definitive care of the injuries.

Steps in the primary survey are as follows:

a. Airway with cervical spine protection
b. Breathing and provision of oxygen
c. Circulation and hemorrhage control
d. Disability evaluation
e. Exposure and examination completely.

Blunt trauma to the chest is fatal in 10% of patients in isolation, rising to 30% if other injuries are present.[6] The majority of chest injuries are confined to the thoracic cage. These consist of rib fractures with underlying pulmonary contusion, hemothorax, or pneumothorax.[7,10]

In this study, all the included patients had a rib fracture with significant hemo or pneumothorax which required tube thoracostomy.

Simple isolated rib fractures or rib fractures with minimal hemo or pneumothorax were managed conservatively with antibiotics, analgesics. However, they were not included in this study. Initially, parenteral analgesics were given later switched over to oral analgesics. Six patients with multiple rib fractures were given thoracic epidural analgesia. All the patients had good pain relief and were comfortable and improved well.

Patients with a fracture of the first or second ribs were evaluated carefully for serious injuries. Of the eight patients with the first or second rib fractures, two patients died. Mortality is high in the first and second rib fractures due to the associated injuries to the great vessels, abdomen and head and neck are common.

Patients with fractures of the lower ribs routinely underwent ultrasound abdomen to rule out injury to liver and spleen. Patients with pre-existing chronic pulmonary disease managed with bronchodilators, chest physiotherapy, and oxygen support.

Patients with rib fractures with underlying hemothorax or pneumothorax with respiratory distress underwent tube thoracostomy on the day of admission. Patients with multiple rib fractures with respiratory distress also underwent tube thoracostomy and were managed in the ICU and given ventilator support. Thoracic epidural analgesia was given for pain relief.

One patient with massive hemothorax and continuous blood loss in intercoastal drainage drain more than 1000 ml at the time of tube thoracostomy underwent emergency thoracotomy and was found to have a mediastinal tear which was ligated. A total of 5 units of blood transfused. Unfortunately, this patient died. Postmortem findings revealed fracture-dislocation of the left middle cranial

fossa, linear fracture of the left temporoparietal bone, laceration of the right cerebrum with subarachnoid hemorrhage, fracture right 2, 3, and 4 ribs, and fracture left 6 and 7 ribs with a left lung contusion. He appeared to have died of associated head injury.

Another patient who died was a 61-year-old male with fracture left 2, 3, 4, and 5 ribs with Glasgow Coma Scale – 3/15 with depressed fracture left frontal bone. Postmortem report revealed that he died due to associated head and cervical spine injury. Another patient who died had sustained fractures 2, 3, 4, and 5 ribs with flail chest and hemothorax. Postmortem revealed that he died due to chest injury.

Thus of the three patients who died in this study, one had died due to chest injury and the other two patients had associated head and cervical spine injury.

No patient with cardiac injury was encountered in this study.

However, the main inference from the study is that blunt trauma and pulmonary contusions can have considerable mortality, especially in the face of hypoxemia and measures to limit hypoxemia should be undertaken early.

CONCLUSION

The various factors which adversely affect the outcome of a patient with blunt injury chest are age, pre-existing chronic pulmonary disease, first and second rib fractures, multiple rib fractures, flail chest, failure to insert a chest drain when indicated, and associated injuries to other vital organs. The most common cause of blunt injury chest is a road traffic accident. The majority of chest injuries are confined to the thoracic cage. Rib fractures with underlying hemo or pneumothorax can be usually managed effectively by tube thoracostomy. Thoracic epidural analgesia gives good pain relief and improves survival in multiple rib fractures and flail chest patients.

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Original Article

Predisposing Factors and Outcome of Fournier's Gangrene

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Abstract

Introduction: Fournier's gangrene (FG) is the fulminant necrotizing fasciitis of the perineum and genitalia resulting from polymicrobial infection. This disease is known to be prevalent for many centuries.

Aim: This study aims to study the predisposing factors associated with FG and its outcome.

Materials and Methods: Patients with features of necrotizing fasciitis of the perineal/genital regions were included in the study. The diagnosis was confirmed by clinical examination and detailed history regarding prior history of diabetes mellitus, hypertension, perianal sepsis, urinary retention/extravasation, trauma, and immunodeficiency states was recorded. The mortality and morbidity rates were calculated.

Results: Diabetes was the most common predisposing factor associated with FG (44.4%). *Escherichia coli* was the most common organism involved both in survivors and non-survivors group. One-third of the patients were infected with multiple species. The mortality rate encountered in our study was 15%.

Conclusion: Early recognition of the pathology and aggressive surgical debridement is the mainstays of the management of FG. Additional strategies to improve wound healing and increase patient survival are also needed.

Key words: Debridement, Fournier's gangrene, Management, Necrotizing fasciitis

INTRODUCTION

The pathologic condition, currently known as Fournier's gangrene (FG), was first described as a pathology localized to the scrotum by Jean-Alfred Fournier in 1883.[1] According to Fournier, the disease was fulminant gangrene of the scrotum and penis seen, especially in healthy young males, and had a sudden onset and rapid progression. Data from contemporary series indicate that FG tends to affect patients with advanced age, predisposing medical conditions, and mostly an identifiable etiology.[2] Although there are some controversial features in the description, the clinical picture of FG is typical and is a condition, usually accompanied by anaerobic or aerobic polymicrobial infections, which begins in the genital or perineal region and rapidly spreads to the abdominal wall causing tissue gangrene. Despite the fact that knowledge regarding the etiology, diagnosis, and treatment has increased, FG retains its characteristic of pathology with high mortality rate.[2,3]

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Aim

This study aims to study the predisposing factors associated with FG and its outcome.

MATERIALS AND METHODS

All patients admitted in the General Surgical wards of Government Rajaji Hospital with the diagnosis of FG were included in the study. The study period was between September 2011 and August 2013 which is 24 months to be exact. The selection criteria used were such that patients with features of necrotizing fasciitis of the perineal/genital regions admitted during the specified time period were included in the study. Other closely resembling clinical pathologies such as torsion testis, acute/chronic epididymo-orchitis, pyocele, and urinary extravasation were excluded from the study.

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The diagnosis was confirmed by clinical examination and detailed history regarding the prior history of diabetes mellitus, hypertension, perianal sepsis, urinary retention/extravasation, trauma, and immunodeficiency states was recorded. Complete physical examination of the patient was done including the site, extent, and depth of the disease. Routine investigations including hemoglobin %, complete blood count, erythrocyte sedimentation rate, random blood sugar, renal function test, serum electrolytes, urine sugar and acetone (if required), pus culture, and sensitivity and screening for HIV were done as required. Broad-spectrum antibiotics were administered initially and later changed to antibiotics according to their pus culture and sensitivity. Those patients who presented with shock were initially resuscitated and then proceeded to definitive treatment, which is surgical debridement. The debridements were done on a daily basis until healthy granulation tissue was seen over the ulcer bed. After then, either the wound was allowed to heal by secondary intention or by secondary suturing or by a split skin graft or a local flap. The outcome of the patients was noted. The mortality and morbidity rates were calculated.

RESULTS

This study encompasses a total of 27 patients, all cases were male. The majority of the cases were in the age group between the 6th and 7th decades, which was about 37% (10 cases) followed by 40–50 years age group with 26% (7 cases). The disease was predominantly found to occur in the low socioeconomic status disease in the study (89%).

Diabetes mellitus holds a significant share in leading to FG in the study. It comes up to 44% (12 cases) followed by hypertension with 22% (6 cases). The other significant factors are urinary stricture with extravasation (11%) and perianal sepsis (15%). Trauma accounts for 1 case (4%). Idiopathic, i.e., no known significant factors takes up to 25% of the total [Figure 1].

Regarding the spread of the disease and its extent, perineum was most commonly involved in the study, i.e., 48% of the cases. Extension to the thighs and anterior abdominal wall was the next predominant sites with 26% and 22%, respectively. The genital organs, i.e., penis were invariably not involved in all the cases. When the disease involves the abdominal wall, the mortality rate shoots up to 67% followed by 57% when it involves thighs and 31% in cases of perineal extension [Table 1].

In this study, about 52% of the patients were admitted to the hospital after 2 days of their initial symptom. Around 19% and 11% of the patients were admitted after 1 and 3 days of their initial symptom, respectively. The significance of these statistics is that there was absolutely no mortality in these patients. However, when the days get longer, the mortality rate rises significantly. About 7% of the patients showed themselves at the hospital after 3 days, in which the mortality rate was 50%. When the day becomes 4, there is 100% mortality rate.

The survivors group presented after a mean of 2 days of their initial symptom, whereas it was 4.75 for the non-survivors. The mean duration of hospitalization for the survivors was 37.9 while for the non-survivors group, it was 3.25 [Figure 2].

Almost 52% of the patients required a minimum of 3–5 debridements. About 19% of the patients required more than 10 debridements. The number of debridements

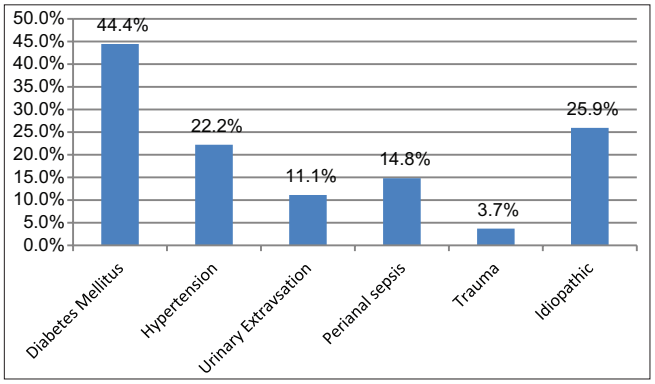

Figure 1: Distribution of patients according to predisposing factors

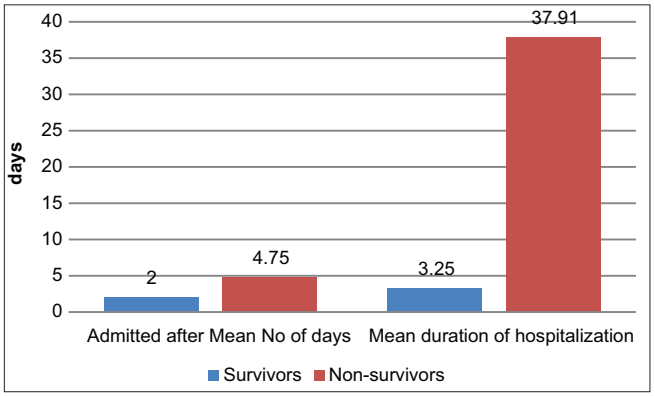

Figure 2: Mean duration of hospitalization between survivors and non-survivors

Table 1: Distribution of patients correlating the extent of spread and mortality

Extent of spread	Number of cases	Number of deaths	Mortality rate (%)
Perineum	13	4	30.77
Abdominal wall	6	4	66.67
Thighs	7	4	57.14

generally correlates with the number of days of stay in the hospital. More the number of the debridements, longer the stay in the hospital [Figure 3].

Various organisms, alone or in combination, were cultured from the wound. *Escherichia coli* (n = 11, 40.74%) and *Klebsiella* (n = 7, 25.93%) were the most commonly isolated bacteria. The other organisms isolated were *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, and *Bacteroides* species.

Although surgical debridement and antibiotics are the principles of treatment in FG, definitive treatment after the initial step is mandatory. On discussing the various options available, 40% of the patients required split skin grafting for wound cover after the primary debridement, making it the most popular of the treatment options. About 25% of the subjects were left to heal by secondary intention, mostly because the size of the remnant wound was too small or the scrotal wound had gone in for contraction. About 18% of the subjects needed secondary suturing for the remnant wound. About 7% of the patients were subjected to a temporary proximal loop colostomy as the perineal

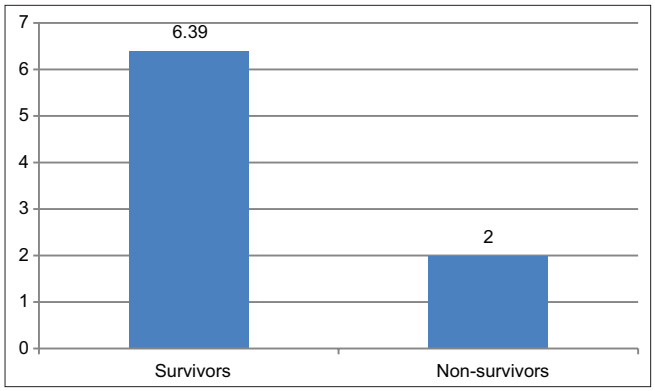

Figure 3: Distribution of debridements

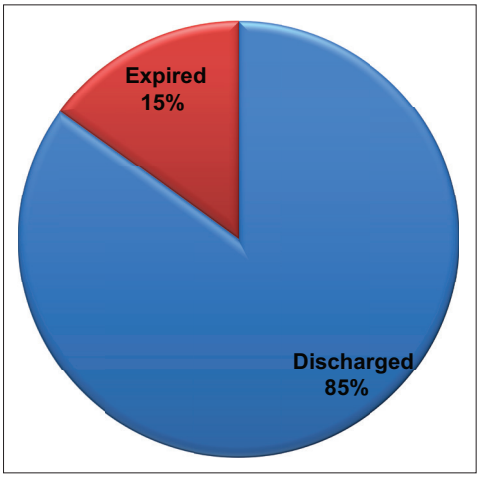

Figure 4: Distribution of outcome

extension of the disease had gone into deeper planes involving the anal sphincters, leading to anal incontinence resulting in fecal soiling of the wound. These patients would later be subjected to sphincter repair and colostomy closure at a later date. Another 7% of the patients had to undergo suprapubic cystostomy due to the etiology of the FG in these cases. These were urinary extravasation resulting from urethral stricture, leading to the onset of FG.

The total number of patients in the study was 27, of which 4 patients expired and the remaining 23 were discharged. The mortality rate in the study was 15% Figure 4.

DISCUSSION

FG remains a pathological condition with high mortality. The mortality rates reported in the literature range between 3% and 45% and severe sepsis, coagulopathy, acute kidney failure, diabetic ketoacidosis, and multiple organ failure are given as the causes of the deaths.[2,3] One of the most important factors altering the prognosis of the patient has been reported to be the extent of the area affected by the pathology.[4] Furthermore, conditions such as advanced age, colorectal origin of the disease necessitating colostomy, and the presence of renal or hepatic failure have also been shown to be factors which adversely affect prognosis.[2,5]

Many conditions believed to contribute to the development of the disease are diabetes mellitus, alcoholism, immunosuppression, local trauma, genitourinary infections, acquired immunodeficiency syndrome,[6] malignant neoplasms,[7] and liver and renal disease.[8] In all these conditions, there was a decrease in the host immunity that determined the development of the infection. Diabetes mellitus is the most commonly associated comorbid condition (20–70%),[9] but controversy still exists as to whether or not diabetes mellitus is associated with increased mortality. In a study by Torremadé Barreda *et al.*[9] and Yanar *et al.*,[10] there was no increase in the mortality in diabetic patients. In their study, Nisbet and Thompson[11] concluded that diabetes is a risk factor for the occurrence of FG, but it does not affect the prognosis. However, if diabetes mellitus is associated with chronic alcoholism, then it carries a bad prognosis.[12] Immunosuppression is also a very important contributing factor, especially in post-transplant patients[13] and in patients receiving bone marrow transplantation,[14] because in such patients, their immunosuppressive state favors bacterial, viral, and fungal infection.

In a study of 1641 males with FG (treated at 593 hospitals) by Sorensen *et al.*,[15] increased mortality was associated with increasing patient age, four specific comorbidities (hypertension, congestive heart failure, renal failure,

and coagulopathy), certain procedures required during admission (colostomy, penectomy, mechanical ventilation, and dialysis), increased length of hospital stay, and cases presenting to urban institutions and teaching hospitals. Each operation that a patient required also increased the unadjusted odds of death by 27% (likely reflecting more severe FG). In contrast, requiring orchiectomy was associated with 70% decreased mortality risk. On the other hand, the patients' ethnicity or race and the number of surgeries did not predict mortality.

CONCLUSION

FG is a rare but severe and rapidly progressive condition with considerable morbidity and mortality, and hence, it should be treated with aggressive fluid resuscitation along with appropriate antibiotics (both local and systemic) and repeated extensive debridement of the involved area to improve survival. Since the prognosis is mainly related to early diagnosis, a high index of suspicion and early diagnosis leads to a more favorable outcome.

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Original Article

Clinical Study and Management of the Incisional Hernia: A Retrospective Study

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Abstract

Introduction: Incisional hernia is the most frequent post-operative complication following abdominal surgery. Several studies have shown that incisional hernias have different etiologies that are related to the patient, the surgical technique, the suture material, and the experience of the surgeon.

Aim: This study aims to study various factors leading to the development of this condition and surgical techniques practiced to repair the incisional hernia.

Materials and Methods: This retrospective study was conducted in the Department of General Surgery at Government Headquarters Hospital, Ramanathapuram, inpatient underwent surgery for incisional hernia. Data on clinical examination, type of operative procedure, and post-operative complications were collected.

Results: Eighteen cases underwent surgery for an incisional hernia, female predominance, and age group of 31-40 years were common, the common previous surgery was laparotomy (56%), the common surgical incision is median vertical (50%). About 28% of patients had post-operative pain, 22% of patients had seroma, and 17% of patients had wound infection, no mesh-related infection noted in our study.

Conclusion: In incisional hernias, the choice of operative technique is crucial. Incisional hernias occur more often in females as they are more likely to undergo lower abdominal surgeries. Mesh repair is considered superior to anatomical repair alone and we recommend laparoscopic hernioplasty as the first line of treatment.

Key words: Etiology, Incisional hernia, Mesh repair

INTRODUCTION

An incisional hernia is an iatrogenic hernia.[1] It is a common complication after abdominal surgery with a reported incidence of 11–20%.[2] Incisional hernia is defined as any abdominal wall gap with or without a bulge in the area of a post-operative scar perceptible or palpable by clinical examination or imaging.[3] More often than not, the problem is recurrent and tests the abilities of even the most experienced surgeons.[4] Unlike other abdominal wall hernias, which occur through anatomical points of weakness, incisional hernias occur through a weakness at the site of abdominal wall closure.[5]

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It is one of the most frequent long-term complications of abdominal surgery, and it continues to be a significant problem for patients as well as surgeons. Unfortunately, attempts to repair these hernias have not been uneventful, with high rates of hernia recurrence, and considerable rates of morbidity and mortality, making many surgeons hesitant to undertake incisional hernia repair.

The technique of repair for abdominal incisional hernia is simple resuturing if the defect is small, but it is associated with a recurrence rate of 15–20%. Cattell's repair, Maingot's keel repair[6] and shoelace darn repair are in vogue.[7] Various prosthetic grafts used for repair are nylon, polymer, polyester, polypropylene, polyglactin, polydioxanone, and polytetrafluoroethylene. Prosthetic mesh for hernia repair is started in 1958 after Usher reported his first experience. Since then, polypropylene mesh is widely used for closure of defects in hernia with good results.[8]

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Aim

This study aims to study various factors leading to the development of this condition and surgical techniques practiced to repair the incisional hernia.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of General Surgery at Government Headquarters Hospital, Ramanathapuram. The patient admitted for incisional hernia surgery from May 2019 to October 2019 was included in the study. Exclusion criteria: Patient with associated blunt injury abdomen, patient with associated portal hypertension with ascites, the patient associated with intra-abdominal malignancy and malignant ascites, and patient with features suggestive of complications were excluded from the study. Data regarding the time of appearance and duration of swelling after index surgery, pain associated with swelling, the indication of previous abdominal surgery, history of post-operative complications at that time, type of surgery, and post-operative complications such as wound infection and wound dehiscence were recorded from the patient in the prescribed pro forma.

RESULTS

In our study, 18 cases of incisional hernia were included in the study. The most vulnerable age group in this study was 31–40 years (28%) [Figure 1]. In 18 cases, 11 cases were female and 7 were male patients [Figure 2].

Majority of patients 67% presented with swelling over the anterior abdominal wall after the previous surgery and 33% of patients presented with both pain and swelling [Figure 3].

Ten patients had the previous history of emergency laparotomy and 4 had the previous history of LSCS and few others have a history of hysterectomy (2), cholecystectomy (1), and sterilization (1) [Figure 4].

Patients with median vertical incision (50%) had more incidence of incisional hernia compared to Pfannenstiel incision (22%) [Figure 5].

In 18 cases, 6 cases underwent onlay repair, 6 sublay repairs, 3 component separation repair, and 3 laparoscopic repairs [Figure 6].

In our onlay repair patients, two cases experience post-operative pain and two cases had seroma, one case sublay repair had post-operative pain and one had seroma, one case in component repair had post-operative pain, wound infection, and seroma, one case in laparoscopic repair had post-operative pain, and 1 had seroma [Table 1].

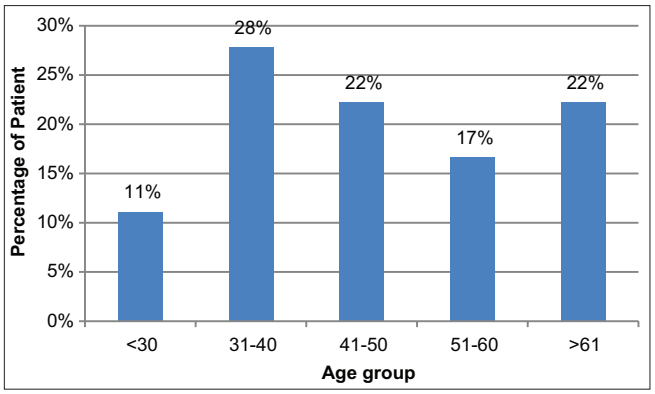

Figure 1: Distribution of age group

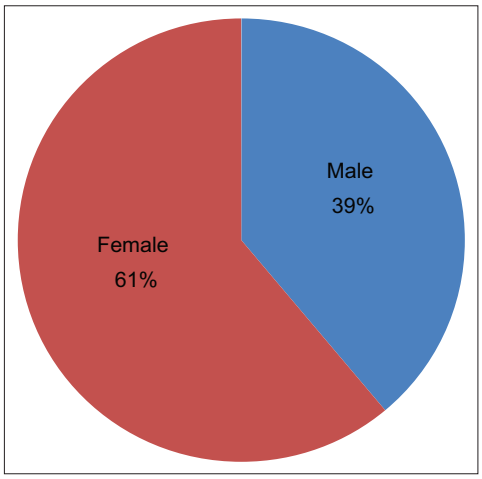

Figure 2: Distribution of gender

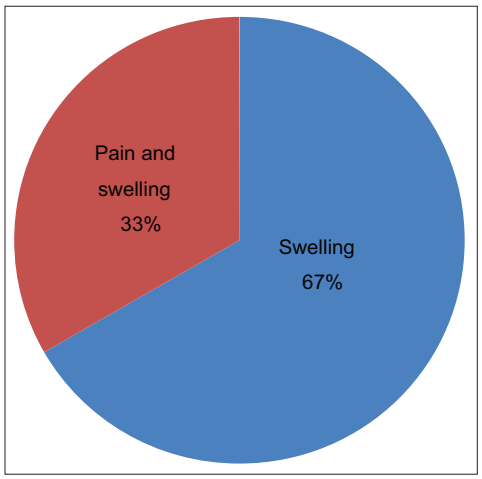

Figure 3: Distribution of mode of presentation

DISCUSSION

Post-operative incisional hernia repair is one of the most common surgical procedures being performed in general

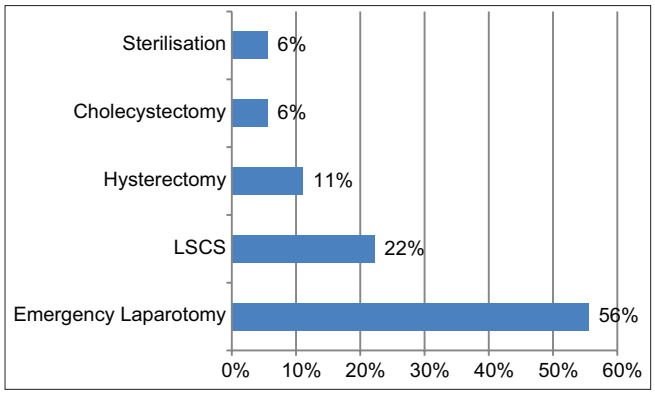

Figure 4: Types of surgery causing the incisional hernia

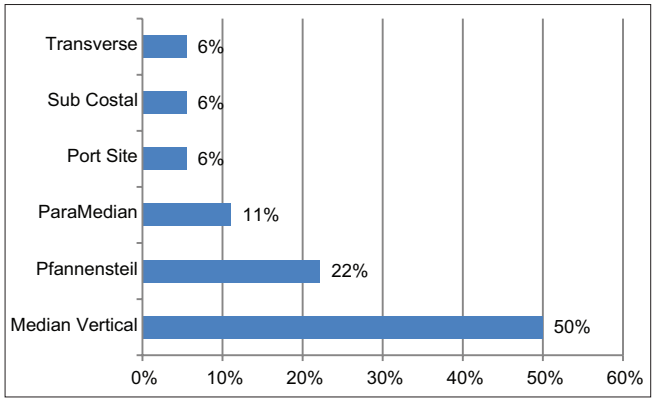

Figure 5: Types of incision causing the incisional hernia

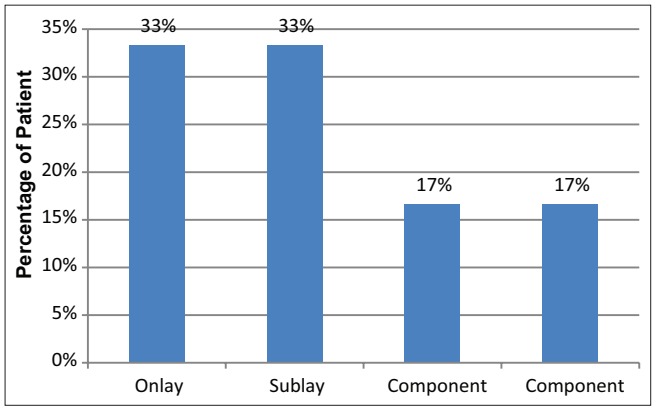

Figure 6: Distribution of various incisional hernias repair

Table 1: Distribution of post-operative complication

Complications	Onlay	Sublay	Component	Laparoscopic
Pain	2	1	1	1
Pelvic collection	0	0	0	1
Wound infection	1	1	1	0
Wound dehiscence	1	0	0	0
Seroma	2	1	1	0
Fever	1	1	0	1

surgery.[8,9] Carlson *et al.* identified that the patients with incisional hernia were between 25 and 90 years and mean age of 60.3 years. In our study, most of them are 4th and 5th decades of life due to the predominance of female patient who underwent surgery for childbirth.[10]

Seroma formation is one of the most common complications associated with onlay mesh hernioplasty due to the wide undermining involved.[11] Extensive dissection for mesh placement and premature removal of the subcutaneous drain may contribute to this complication. Bucknall *et al.* reported that the previous surgery had been complicated by post-operative wound infection in 48.8% developed hernia.[12]

In our study, no mesh-related infection has been noted. The most important point regarding the prevention of mesh-related infections is that foreign body reactions depend on the amount of the prosthesis (mesh) used. For this reason, surgeons should try to minimize the area of mesh that is introduced during the hernia operation since the inserted foreign material is an ideal medium for bacterial colonization. In addition, four main approaches to the prevention of mesh infection have been used. First, the wound can be rinsed with an antibiotic-containing solution, starting immediately after the dissection of the hernia sac, and then intermittently until the skin is sutured. However, the effectiveness of lavage with solutions containing antimicrobial agents is controversial since antibiotics require a defined duration of contact with pathogens, while lavage is usually a more rapid process. A second approach involves the use of material placed in front of the mesh to slowly deliver an antimicrobial agent locally. Third, a mesh containing embedded antimicrobial agents can be used. Such a mesh is thought to help prevent bacterial adhesion and colonization when implanted in wounds, with a subsequently reduced likelihood of post-operative infections. Finally, the traditional intravenous perioperative administration of antimicrobial agents can be used. Although hernia repair operations are classified as clean surgery, the administration of intravenous antibiotics perioperatively has been shown to be beneficial if a prosthetic material (mesh) is involved.[13,14]

CONCLUSION

In incisional hernias, the choice of operative technique is crucial. Incisional hernias occur more often in females as they are more likely to undergo lower abdominal surgeries. Mesh repair is considered superior to anatomical repair

alone and we recommend laparoscopic hernioplasty as the first line of treatment.

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Original Article

Maternal and Fetal Outcome of Cardiac Disease in Pregnancy: A Retrospective Study at Tertiary Institute

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Abstract

Introduction: Cardiac disease in pregnancy is still a major cause of maternal and fetal mortality. Although the reported incidence varies between 0.1 and 4%, 1–3 cardiac disease remains a significant cause of maternal death worldwide. The incidence of cardiac disease during pregnancy has remained stable for many years even with a significant decrease in the occurrence of rheumatic heart disease (RHD) as this decrease is being compensated by significant increase of pregnancy in women with congenital heart disease (CHD). Therefore, in this study, we aim to analyze the incidence of cardiac disease in pregnancy and to assess the maternal and fetal outcome.

Materials and Methods: The retrospective study was carried out in 47 women with cardiac disease in a tertiary institute over a period of 2 years.

Results: In the present study, incidence of cardiac disease at our centre was 0.081%. RHD was the most common heart disease in pregnancy (70.21%) followed by CHD (23.40%) and peripartum cardiomyopathy (6.38%). Among RHD, mitral valve stenosis was most common followed by mitral stenosis with mitral regurgitation. Number of vaginal deliveries was 36 and cesarean was done in 11 patients.

Conclusions: A cardiac disease is a high-risk pregnancy. It is a multidisciplinary teamwork to have optimal maternal and fetal outcome. Hence, constant vigilance is required throughout antenatal, intrapartum, and postpartum period to avoid adverse outcomes.

Key words: Complications, Congenital heart disease, MS, Outcome, Rheumatic heart disease

INTRODUCTION

Cardiac disease in a pregnancy is a high-risk pregnancy, it possesses a significant challenge to an obstetrician. In western countries about 0.2–0.4% of all pregnancies are complicated by cardiovascular disease.[1] The incidence of cardiac disease is 1–4% of pregnancies in India.[2] In India, the prevalence of cardiovascular diseases in pregnancy lied between 0.3 and 3.5%. In the presence of maternal heart disease, the circulatory changes of pregnancy may result in decompensation or death of mother or fetus.[3] Cardiac disease in pregnancy is the important indirect cause of maternal mortality globally.[4] The most common heart diseases in pregnancy are RHD and CHD while ischemic heart disease and cardiomyopathy are less common. Although RHD is the most common cardiac disease in developing countries, it is uncommon in developed countries.[5] Pregnancy is associated with various physiologic changes in cardiovascular systems such as an increase in plasma volume and cardiac output and increase in heart rate. Thus, the most common clinical features of cardiac disease such as breathlessness, pedal edema, and murmurs mimic normal physiological changes in pregnancy posing a diagnosing difficulty

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for obstetricians. The heart rate comes to normal level within 10 days after the delivery while it takes 3 months for stroke volume, cardiac output, and systemic vascular resistance to return to pre-pregnancy level.[6]

The obstetrical complications such as pre-eclampsia, anemia, preterm labor, and fetal growth restriction further worsen the outcome and complicate the management of pregnancy with cardiac disease.

Pregnancy-related complications that compound the heart disease are ignored in the rural setup and patients rarely seek proper early care.[7]

Aims and Objective

The aim of this study is to analyze the incidence of cardiac disease in pregnancy and to assess the maternal and fetal outcome.

MATERIALS AND METHODS

This was a retrospective study carried out at the Department of Obstetrics and Gynaecology, SMGS Hospital, GMC, Jammu, over the period of 2 years from October 2017 to September 2019.

A total of 47 pregnant women with cardiac disease admitted during the study period were included in the study. The data were obtained from medical records and files.

The following factors were examined such as demographic information, diagnosis, course in the hospital, management, and maternal and fetal outcome.

Inclusion Criteria

Pregnant women with a history of or newly diagnosed cardiac disease were included in the study.

Exclusion Criteria

All conditions mimicking heart disease were excluded from the study.

The data collected were statistically analyzed to see the impact of cardiac disease on pregnancy and to evaluate maternal and fetal outcome.

RESULTS

A total of 47 pregnant women with cardiac disease were included in the study. The incidence of cardiac disease at our center was 0.081%. Of 47 patients, majority of patients were in the age group of 22–25 years (46.8%) and 22.53% belonged to 18–21 years [Table 1].

Table 2 shows the distribution of patients according to parity. Among the 47 pregnant women, 38.29 were primigravida, 25.53% were second gravid, 19.14% were gravida 3, and about 17.02% were gravida 4 and more.

Of 47 patients, majority were term gestation (51.06%), about 31.94% were pre-term and 17.02% were post-term [Table 3].

Most of the patients in the study had rheumatic heart disease (RHD) (70.21%) followed by congenital heart disease (CHD) (23.40%) and peripartum cardiomyopathy (6.38%) as shown in Table 4.

The most common CHD seen in our study was atrial septal defect (ASD) (54.54%), ventricular septal defect (VSD) was seen in 4 patients, and pulmonary stenosis was seen in 1 patient. The most common lesion in patients with RHD was mitral stenosis (57.57%) followed by mitral stenosis with mitral regurgitation (24.24%) followed by mitral regurgitation (15.15%). Aortic lesion was seen in one patient who presented with aortic stenosis [Table 5].

In our study, the surgical correction was done in 8 patients, 3 patients underwent ASD closure, 1 patient VSD closure, in 3 patients mitral valve replacement was done, and in 1 patient patent ductus arteriosus closure was done [Table 6].

Most of patients had vaginal delivery (76.59%) and cesarean section was done in 11 patients (23.40%) as shown in Table 7. The labor was of spontaneous onset in 44.68% of patients and induced in 3 cases (6.38%). In 12 patients, outlet forceps were used to cut short the second stage of labor. The various indications for LSCS were fetal distress, cephalopelvic disproportion, and malpresentation.

The common noncardiac complications noticed were anemia (38.29%), pre-term labor (23.40%) and pre-eclampsia (12.76%) and abruption placentae (2.12%). Cardiac complications were seen in patients. The most common cardiac complication was CCF (3 patients). Pulmonary edema was seen in 2 patients [Table 8]. Atrial fibrillation was seen in 1 patient. Maternal mortality was seen in 2 cases in our study. The cause of death was atrial fibrillation in 1 patient and other patient died due to severe pulmonary hypertension.

Intrauterine growth restriction (IUGR) was seen in 29.78% of patients, pre-maturity was seen in 23.40% of babies [Table 9]. The other neonatal complications were birth asphyxia, low Apgar score, and meconium. A total of 15 neonates were admitted in neonatal intensive care unit (NICU).

Table 1: Distribution of patients according to age

Age (years)	*n* (%)
18–21	12 (25.53)
22–25	22 (46.8)
26–29	8 (17.02)
30–35	5 (10.63)

Table 2: Distribution of patients according to parity

Parity	*n* (%)
Primigravida	18 (38.29)
Gravida 2	12 (25.53)
Gravida 3	9 (19.14)
Gravida 4 and more	8 (17.02)

Table 3: Distribution according to the gestational age at which patient came to hospital

Gestational age (weeks)	*n* (%)
28–32	4 (8.51)
33–36	11 (23.40)
37–40	24 (51.06)
>40	8 (17.02)

Table 4: Prevalence of cardiac disease

Type of cardiac disease	*n* (%)
Congenital heart disease	11 (23.40)
Rheumatic heart disease	33 (70.21)
Peripartum cardiomyopathy	3 (6.38)

Table 5: Type of lesion

Type of lesion	*n* (%)
Congenital heart disease (11)	
ASD	6 (54.54)
VSD	4 (36.36)
PS	1 (9.09)
Rheumatic heart disease (33)	
MS	19 (57.57)
MR	5 (15.15)
MS+MR	8 (24.24)
AS	1 (3.03)

Table 6: Distribution of patients according to cardiac surgical interventions

Surgical correction	*n*
ASD closure	3
VSD closure	1
Mitral valve replacement	3
PDA closure	1

ASD: Atrial septal defect, VSD: Ventricular septal defect PDA: Patent ductus arteriosus

Table 7: Distribution of patients according to mode of delivery

Mode of delivery	*n* (%)
Vaginal delivery	36 (76.59)
Spontaneous	21 (44.68)
Induced	3 (6.38)
Instrumental deliveries	12 (25.53)
Cesarean section	11 (23.40)

Table 8: Maternal complications

Complications	*n* (%)
Non-cardiac	
Anemia	18 (38.29)
Pre-eclampsia	6 (12.76)
Abruptio placentae	1 (2.12)
Cardiac	
CCF	3 (6.38)
Pulmonary edema	2 (4.25)
Atrial fibrillation	1
Pulmonary artery hypertension	1 (2.12)
Maternal mortality	2

Table 9: Neonatal outcome

Complications	*n* (%)
IUGR	14 (29.78)
Preterm	11 (23.40)
Apgar score <7 at 1 min	7 (14.89)
Birth asphyxia	5 (10.63)
Meconium	3 (6.38)
NICU admission	15 (31.91)

IUGR: Intrauterine growth restriction, NICU: Neonatal intensive care unit

DISCUSSION

Cardiac disease is a major risk factor for maternal and neonatal morbidity and mortality. In our study, the incidence of cardiac disease was 0.081%. In a study by Pujitha *et al.*,[8] the incidence of cardiac disease in their study was 0.21%. The predominant lesion in our study was RHD (70.21%) followed by CHD (23.40%) and peripartum cardiomyopathy (6.38%). Puthija *et al.* also found similar results in their study, RHD (62.6%) was the most common lesion in their study followed by CHD (21.8%) and peripartum cardiomyopathy (15.6%). Shaifali Patil *et al.*[9] also report RHD as the most predominant lesion in their study. The observations were also comparable with other studies done by Sheela *et al.*[10] The incidence of rheumatic fever has been greatly reduced because of increasing use of effective antibiotics against streptococcal bacteria.

The most commonly found valvular lesion in our study was mitral stenosis (57.57%) followed by mitral stenosis with mitral regurgitation (24.24%) followed by mitral regurgitation (15.15%). Aortic valve was involved in

1 patient in whom aortic stenosis was present. Puthija *et al*.[8] also found mitral valve as the most common lesion in their study (56.3%) followed by aortic valve disease (6.25%). Mitral stenosis was also found to be the most common lesion in study by Shaifali Patil *et al*.[9]

RHD affects about 0.3–3.5% of women in the childbearing period with a global use of 1%.[11] It is responsible for 30% of cardiac disease during pregnancy in developed countries and 90% in developing countries.[12,13]

Of 47 patients, in the present study, 10.64% underwent surgical correction for cardiac disease. However, in study by Puthija *et al*.[8] about 40.6% patients underwent surgical correction and same results were shown by study conducted by Bhatla *et al*.[14] While studying the mode of delivery, 36 patients delivered vaginally, of which 12 patients had instrumental vaginal delivery to cut short the second stage of labor and 11 patients had cesarean section. The results were comparable with study conducted by Puthija *et al*.[8]

The most common obstetric complications were anemia which was seen in 18 patients, followed by pre-term in 11 patients, pre-eclampsia in 6 patients, and abruption placentae in 1 patient. The results were comparable with study done by Puthija *et al*.[8] The most common cardiac complications were CCF seen in 3 patients, followed by pulmonary edema (2 patients), atrial fibrillation (1 patient), and pulmonary hypertension (1 patient). In our study, maternal mortality was seen in 2 cases. One patient developed atrial fibrillation and other died due to severe pulmonary hypertension. Puthija *et al*.[8] in their study reported one maternal death.

In this study, we had 15 NICU admissions due to birth asphyxia, IUGR, pre-term, and MSAF. Results were comparable with Puthija *et al*.[8] and Prameela *et al*.[15]

CONCLUSIONS

Cardiac diseases in pregnancy are high-risk condition and have a major impact on pregnancy and maternal and fetal outcome. This study results conclude that RHD is still a predominant cardiac problem affecting pregnancy. The early detection, treatment, prevention of infections, proper follow up, and correction before pregnancy can improve the pregnancy outcome and decrease the maternal morbidity. Cardiac disease in pregnancy is common public health problem in developing countries. Hence, each patient coming to OPD or during labor even without symptoms should be auscultated by a doctor. Educating the community about the early ANC registration, regular ANC, identification of risk factors, and actions should be taken before onset of the disease. Regular antenatal screening, identification of risk factors, and early diagnosis and treatment of the diagnosed heart disease in pregnancy are recommended measures to improve the outcomes of pregnancy and hence to reduce maternal and fetal morbidities.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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Original Article

Prevalence of Different Clinical Variants of Nephrotic Syndrome in Children 1–18 Years of Age in Tertiary Care Hospital of North India

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Abstract

Introduction: Childhood nephrotic syndrome has an incidence of 90–100 per million population of India. This study was conducted with the primary objective of studying the prevalence of different clinical variants of childhood nephrotic syndrome (new-onset steroid-sensitive nephrotic syndrome/infrequent relapsing nephrotic syndrome [IFRNS]/frequently relapsing nephrotic syndrome [FRNS]/steroid-dependent nephrotic syndrome [SDNS]/steroid-resistant nephrotic syndrome [SRNS]), while the secondary objectives were to estimate the prevalence of use of steroid-sparing drugs in those with FRNS and SDNS.

Materials and Methods: A retrospective study of all patients referred to renal diseases clinic at Government Medical College, Jammu, was done. Records of 61 children of 1–18 years of age fulfilling the International Study of Kidney Disease in Children criteria for nephrotic syndrome attending to our nephrology clinic were reviewed over 1 year period. Standard definitions for new-onset nephrotic syndrome, IFRNS, FRNS, SDNS, and SRNS were used. Steroid-sparing drugs used were levamisole in FRNS and low-dose SDNS whereas cyclophosphamide, mycophenolate mofetil (MMF), and tacrolimus in high-dose SDNS.

Results: Among nephrotic syndrome, patients mean age of presentation was 5.95 years, with M: F ratio of 1.77:1. Infrequent relapsers (27.9%) were the most prevalent clinical variant followed by steroid-dependent nephrotic syndrome (24.6%) and new-onset nephrotic syndrome (21.3%). Prednisolone alone was successful in achieving remission in 50.8% of total cases and less commonly involving use of other immunosuppressants with prednisolone such as levamisole (23%), cyclophosphamide (9.8%), and tacrolimus in (3.3%). However, prednisolone in combination with cyclophosphamide and then MMF was used in 14 (23%) in an aim to achieve full remission, but full remission was achieved in 48 (78.7%).

Conclusion: In the present study, clinical profile of children with nephrotic syndrome was concordant with typical nephrotic syndrome in children. Pattern of nephrotic syndrome differs in our population in terms of increased number with SDNS and response to treatment did not differ significantly from other studies.

Key words: Frequent relapsers, Infrequent relapsers, Mycophenolate mofetil, Steroid dependence, Steroid resistance

INTRODUCTION

Childhood Nephrotic Syndrome is an important chronic disease in children. Incidence is reported to be 2–3/100000 children in western countries while as its incidence is slightly higher (9–10/100000) in indian children and its prevalence is 12–16/100000 children [1]. Nephrotic syndrome, as we know it today, is a combination of proteinuria, hypoalbuminemia, hyperlipidemia, and edema[2], a concept that took some time to be developed. Interestingly, the effective treatments became available only recently in the mid 1900s, with the advent of steroids, antibiotics, diuretics, and other immunomodulators. Even today, there is a gap in our understanding of the etiology(s) of nephrotic syndrome of childhood, and better treatments are still required in the more resistant forms. The syndrome manifests with varied clinical and

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pathological states. Corticosteroids remain the mainstay for treatment of nephrotic syndrome. Based on the response to corticosteroids, children with Nephrotic syndrome segregate into steroid-sensitive group that has a good long term prognosis but risk of frequent relapses/dependence and steroid resistant group that has poor outcomes despite immunosuppression.[2] Response to medications is quite variable with some children requiring further course of steroid sparing agents , while others achieve complete remission after the course of prednisolone. Steriod sparing agents , such as levamisole, cytotoxic agents like cyclophosphamide, Mycophenolate mofetil, calcineurin inhibitors and rituximab are often used to induce or maintain remission with mixed results[2].

This study was undertaken to assess the demographic and clinical profile, prevalence of different clinical variants of childhood Nephrotic syndrome and role of immunosuppresants in achieving remission in our centre as no such data is available from our demographic settings.

MATERIALS AND METHODS

A retrospective study of all patients referred to renal diseases clinic at Government Medical College, Jammu, was done. Records of 61 children in the age group of 1–18 years of age fulfilling the International Study of Kidney Disease in Children (ISKDC) criteria for nephrotic syndrome (NS) attending to our nephrology clinic were reviewed from August 2019 to January 2020.

Inclusion Criteria

- Children 1–18 years with nephrotic syndrome diagnosed as per the ISKDC guidelines (nephrotic range proteinuria with spot urine PCR of >−2, hypoalbuminemia <2.5 g/dl, hyperlipidemia (serum cholesterol >200 mg/dl), and edema.

Exclusion criteria

- Children whose records were not complete were excluded from the study
- Children with secondary causes of nephrotic syndrome were excluded from the study.

Written informed consent was taken from parent/guardian of each child before including them in study. Thorough history, detailed examination, and clinical assessment including anthropometry and blood pressure were noted during evaluation. Laboratory values were acquired for confirmation of our diagnosis and for renal dysfunction. A retrospective study of all patients referred to renal diseases clinic at Government Medical College, Jammu, was done. Our medical college runs special clinic for patients with nephrotic syndrome every Wednesday 3–5 pm. Monthly follow-up of all patients is done. All patients referred to special clinic are investigated for proteinuria. Complete clinical examination is done to rule out complications. Biannually, all children undergo ophthalmic examination to screen for the development of cataract. Period of review was for the year 2019. Review was done from special clinic cards used for documentation of visits of patients in renal disease special clinic. Variables assessed were sex distribution, age at presentation for first attack, duration of edema, steroid responsiveness, and use of steroid-sparing agents. Biopsy was performed on five patients with steroid-dependent nephrotic syndrome (SDNS) and steroid-resistant nephrotic syndrome. Histopathology was suggestive of minimal change disease in two and focal segmental glomerulosclerosis in three.

All analyses were carried out using statistical software, SPSS, after data collection.

RESULTS

The present study consists of 61 cases of nephrotic syndrome attending our Pediatric Nephrology Special clinics in the Department of Pediatrics, GMC, Jammu, over a period of 1 year.

Inclusion and Analytical Sample Flow

A total of 61 cases of nephrotic syndrome were studied in 1 year period from January 2019 to December 2019. Table 1 shows that 63.93% of children were in the age group of 3–9 years and the age ranged from 1 to 16 years with mean

Table 1: Profile of patients with nephrotic syndrome

Variable	Number	Percentage	Mean±SD
Age in years			
0–3	9	14.75	5.95±3.47
3–6	21	34.42	
6–9	18	29.50	
9–12	8	13.11	
12–15	3	4.91	
≥15	2	3.27	
Sex			
Male	39	63.9	
Female	22	36.1	
Duration of nephrotic syndrome in years			
≤1	15	24.59	3.20±2.54
1–3	27	44.26	
3–6	12	19.67	
6–9	6	9.83	
>9	1	1.63	
Duration of edema in weeks			
≤1	31	50.81	1.67±0.96
1–2	23	37.70	
>2	7	11.47	

SD: Standard deviation

age of the onset of nephrotic syndrome as 5.95 years. Male-female ratio was 1.77:1. Mean height of patients was 104.21 ± 19.87 cm (71–163) and the mean weight was 20.15 ± 9.38 kg (9–50). Mean duration of nephrotic syndrome in years was 3.20 ± 2.54 years and mean duration of edema in weeks was 1.67 ± 0.96.

Table 2 shows that infrequent relapsers accounted for maximum number of cases 27.9% followed by SDNS 24.6% and new-onset NS – 21.3%.

Table 2 also shows that prednisolone alone was successful in achieving remission in 50.8% of total cases and less commonly involving use of other immunosuppressants with prednisolone such as levamisole (23%), cyclophosphamide (9.8%), and tacrolimus (3.3%). However, prednisolone in combination with cyclophosphamide and then MMF was used in 14 (23%).

Table 2: Clinical types and use of immunosuppressants in patients of nephrotic syndrome

Clinical types	Number	Percentage
SSNS		
New-onset NS	31	21.3
IFRNS	14	27.9
FRNS	6	19.7
SDNS	8	24.6
SRNS	2	6.6
Immunosuppressants		
PRED		50.8
P+LEV		23.0
P+CYP		9.8
P+MMF		13.1
P+TAC		3.3

SSNS: Steroid-sensitive nephrotic syndrome, SRNS: Steroid-resistant nephrotic syndrome, IFRNS: Infrequent relapsing nephrotic syndrome, FRNS: Frequently relapsing nephrotic syndrome, SDNS: Steroid-dependent nephrotic syndrome, MMF: Mycophenolate mofetil

Table 3: Results of biochemical tests in patients of nephrotic syndrome

Variable	Number	Percentage	Mean±SD (range)
Serum albumin			
≤1.5	17	27.86	1.78±0.46 (0.80–3.5)
1.5–2.5	43	70.49	
2.5–3.5	1	1.63	
Serum cholesterol			
200–300	12	19.67	392.09±105.81 (223–712)
300–400	21	34.42	
400–500	21	34.42	
>500	7	11.47	
Serum creatinine			
<0.5	17	27.86	0.68±0.93 (0.20–7.70)
0.5–1.00	41	67.21	
≥1.00	3	4.91	
BUN			
<20	23	37.70	31.60±2.69 (6.00–177.00)
20–40	26	42.62	
40–60	6	9.83	
≥60	6	9.83	

SD: Standard deviation, BUN: Blood urea nitrogen

Table 3 shows that Mean serum albumin, cholesterol, creatinine, and blood urea nitrogen in the study group were 1.78, 392, 0.68, and 31.60, respectively. Mean spot urine protein-creatinine ratio values were 8.48 accounting for approximately 23% of cases.

Out of 61 cases, one case expired during the study period.

Table 4 shows the status of patients at follow-up. About 78.7% (48) of patients achieved full remission.

DISCUSSION

Patients with NS lose massive amounts of protein in urine, leading to hypoproteinemia, hyperlipidemia, and edema.[1] In this study, we analyzed 61 patients of NS over 1 year, 39 were male, and 22 females with M: F ratio of 1.77:1. In our report, 3–6 years age group constituted maximum number of cases with mean age of 5.95 ± 3.47 years. The mean age was similar to that reported in other studies. In a study by Sahana,[3] mean age at presentation was 7.4 years. In their study, 65% of the subjects belonged to 6–12 years of age followed by 1–5 years (31%). Pandya and Mehta[4] reported mean age as 4.08 years and Kiran and Kumar reported the mean age at presentation as 6.7 years.[5] There were 73 (68.2%) males and 34 (31.7%) females with a male-female ratio of 2.1:1. Sahana[3] found that 76% of the subjects were males while 24% were female with male-to-female ratio of 3.27:1 suggesting a male preponderance. Pandya and Mehta and Kiran and Kumar also observed male predominance in their studies.[4,5] These observations are similar to data available from other centers. The mean age of presentation was similar to other studies. A study in Auckland observed mean age at diagnosis as 5.4 years.[6] A single-center study done in Iran reported mean age of presentation as 4.87 years.[7] According to observational studies, the prevalence of nephrotic syndrome in children has a 2–1 male-to-female ratio. Other studies report an incidence of 1.45–1.9/1.

In our study, infrequent relapse NS accounted for maximum number of cases 27.9% followed by SDNS 24.6% of cases

Table 4: Results of clinical and biochemical remission in cases

Variable	Number	Percentage
Remission		
Full	48	78.7
Partial	8	13.1
No	5	8.2

and new-onset NS – 21.3%. Majority of patients were steroid sensitive 68.9% and steroid dependence was seen in 24.6%, whereas steroid sensitivity documented in earlier studies by Pandya and Mehta[4] was 88.1% and steroid dependence was observed in 8.4% of patients, but our results are in concordance with the prevalence of steroid-sensitive nephrotic syndrome in the literature and other studies.[3] The study conducted by Safaei and Maleknajed demonstrated steroid sensitivity in 66%, steroid resistance in 20.5%, and steroid dependence in 13.5%. Among patients with steroid-sensitive NS, 37% were non-relapsers, 38.8% frequent relapsers, and 26.4% infrequent relapsers.[7]

Prednisolone alone was successful in achieving remission in 50.8% of total cases. Other immunosuppressants used with prednisolone were levamisole (23%), cyclophosphamide (9.8%), and tacrolimus (3.3%). However, prednisolone in combination with cyclophosphamide and then MMF was used in 14 (23%) to achieve complete remission.

However, only 78.7% (48) of patients achieved full remission in our study and 13.1% achieved partial remission and 5 out of 61 patients (8.2%) never achieved remission and were biopsied and two patients were found to be having minimal change disease and three patients had underlying focal segmental glomerulosclerosis. Alhassan *et al*.[8] studied 25 nephrotic patients to determine the patterns in children with NS. The male-to-female ratio was 2:1. Twenty-three (92%) patients were sensitive to the first steroid course and two were steroid resistant, and both of them proved to have focal segmental glomerulosclerosis. Of those who responded, 6 patients (24%) remained in remission, while 17 (68%) patients became steroid dependent. Regarding SDNS, 7 (41%) patients showed infrequent relapsers and 10 (59%) had frequent relapses. Our findings were consistent with the previous studies.

CONCLUSION

In the present study, clinical profile of children with nephrotic syndrome was concordant with typical nephrotic syndrome in children. Pattern of nephrotic syndrome differs in our population in terms of increased number with SDNS and response to treatment did not differ significantly from other studies. However, long-term follow-up with more number of patients is required to substantiate the pattern of disease in our setup.

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Original Article

Incidence of Apical Periodontitis and Frequency of Root Canal Treatments in Geriatric and Medically Compromised Patients in Jammu Population

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Abstract

Background: With the increase in life expectancy, there has been rise in cases of apical periodontitis. The present study was conducted to assess the prevalence of apical periodontitis and root canal treatment among the elderly and medically compromised patients in the Jammu population.

Materials and Methods: The present study was conducted on 150 elderly patients with deep carious teeth of both genders. An equal number of healthy subjects was also recruited. Patients were divided into two groups: Group I was medically compromised patients with apical periodontitis and Group II was healthy subjects with apical periodontitis. Periapical status was scored based on the periapical index.

Results: Group I had 95 and Group II had 60 patients with more than 1 periapical lesion. Group II had 110 and Group I had 48 patients with 1 periapical lesion with at least one obturated tooth. The difference was significant ($P < 0.05$). There was a non-significant difference between Groups I and II with more than 1 periapical lesions with at least one obturated tooth ($P > 0.05$). More than 1 periapical lesion was seen more in renal and respiratory patients (45), 1 periapical lesion with at least one obturated tooth was seen more one diabetic patients (22). The difference was non-significant ($P > 0.05$).

Conclusion: The authors found that medically compromised patients have more periapical lesions with radiographic evidence. They have a lower frequency of obturated teeth than healthy subjects.

Key words: Apical periodontitis, Elderly, Root canal treatment

INTRODUCTION

The main complaint for which most of the patients visit the dental clinic is pain. It can be tooth related or associated facial bones. Apical periodontitis is the widening of periodontal ligament space at the apex of a tooth. The main cause of this is deep caries, fractured tooth, or traumatic occlusion. In most of the cases, the treatment of choice is root canal treatment followed by restoration with the permanent filling material and crown placement.[1]

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With the increase in life expectancy, there has been rise in cases of apical periodontitis. The challenge among dental surgeons is to diagnose cases accurately and the management of these elderly patients.[2] Old patients are also prone to develop a lot of systemic diseases. In India, diabetes, hypertension, osteoporosis, respiratory diseases, renal, and cardiac diseases are highly prevalent. Most of these patients are on long-standing medications for the same; thus, medically compromised patients need proper care and treatment to overcome further complications.[3]

It is mandatory that dentists should be aware and have sufficient knowledge of these medical conditions. Cardiac patients as those with a history of cardiac stents, pacemakers, or hypertensive demand adherence to strict recommended guidelines and with proper antibiotic

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prophylaxis. The use of plain local anesthesia (without adrenaline) is advisable.[4]

Poorly controlled diabetics should be advised to consult the physician first and report only after controlling their glycemic level. Root canal treatment should be started after obtaining consent from their physician.[5] The present study was conducted to assess the prevalence of apical periodontitis and root canal treatment among the elderly and medically compromised patients.

MATERIALS AND METHODS

The present study was conducted in the Department of Conservative Dentistry and Endodontics, Institute of Dental Sciences, Sehora, Jammu, India.

It comprised 150 elderly patients of the Jammu region with deep carious teeth of both genders. An equal number of healthy subjects was also recruited. The purpose of the study was explained to all of them, and their written consent was obtained. Ethical approval from the concerned department was taken beforehand.

Demographic particulars such as name, age, gender, and occupation were recorded in case history pro forma. Patients were divided into two groups: Group I was medically compromised patients with apical periodontitis and Group II was healthy subjects with apical periodontitis. A through oral examination was performed by single dental surgeon. Digital intraoral radiographs were taken. Periapical status was scored based on the periapical index (PAI). Each of the roots was categorized as normal periapical structure, small changes in bone structure, changes in bone structure with some mineral loss, periodontitis with the well-defined radiolucent area, and severe periodontitis with exacerbating features. A score >2 (PAI≥3) was considered to be a sign of periapical pathology. Teeth were categorized as obturated teeth if the root canals are filled. Results thus obtained were subjected to statistical analysis. P <0.05 was considered significant.

RESULTS

Table 1 and Graph 1 show that Group I comprised eight males and 70 females and Group II had 85 males and 65 females.

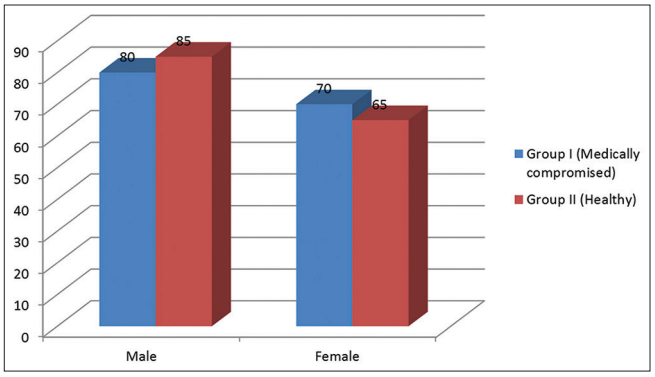
Table 2 shows that Group I had 95 and Group II had 60 patients with more than 1 periapical lesion. Group II had 110 and Group I had 48 patients with 1 periapical lesion with at least one obturated tooth. The difference was significant (P < 0.05). There was a non-significant difference between

Table 1: Distribution of patients

Groups	Group I (medically compromised)	Group II (healthy)
Male	80	85
Female	70	65

Table 2: Distribution of AP and obturated teeth

Variables	Group I	Group II	*P*-value
More than 1 periapical lesion			
Present	95	60	0.01
Absent	55	90	
One Periapical lesion with at least one obturated tooth			
Present	48	110	0.01
Absent	102	40	
More than 1 periapical lesions with at least one obturated tooth			
Present	82	85	0.91
Absent	68	65	



Graph 1: Distribution of patients

Groups I and II with more than 1 periapical lesions with at least one obturated tooth (P > 0.05).

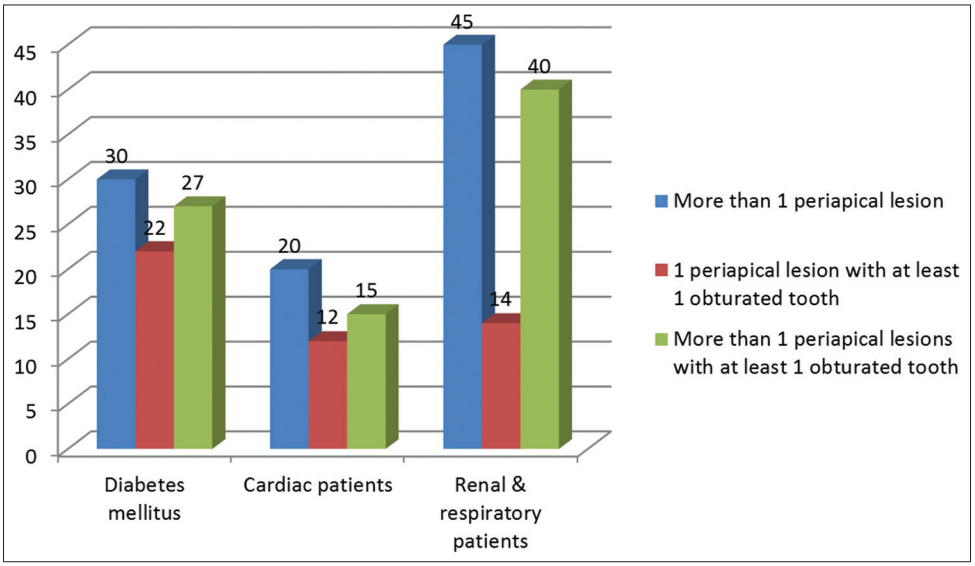
Table 3 and Graph 2 show that more than 1 periapical lesion was seen more in renal and respiratory patients (45), 1 periapical lesion with at least one obturated tooth was seen more I diabetic patients (22). The difference was non-significant (P > 0.05).

DISCUSSION

Endodontic treatment is the best-preferred option for an infected and painful tooth. The foremost option is to preserve the tooth rather than extraction. Endodontic treatment is a sensible procedure of removing the infected dental pulp and periradicular exudates using proper instruments and biocompatible agents in addition to medicaments to preserve the tooth.[6] The dentist should be well versed with the use of various dental products such as dentifrices, alginate, cotton rolls, airotors, local anesthesia, especially in elderly, and medically compromised patients. Elderly people have poor health and medically

Table 3: Distribution based on systemic conditions

Medical condition	More than 1 periapical lesion	1 Periapical lesion with at least one obturated tooth	More than 1 periapical lesions with at least one obturated tooth	*P*-value
Diabetes mellitus	30	22	27	79
Cardiac patients	20	12	15	47
Renal and respiratory patients	45	14	40	99
Total	95	48	82	



Graph 2: Distribution based on systemic conditions

compromised patients such as cardiac, for example, hypertension, congestive cardiac failure, and cardiac stents patients, renal such as those on dialysis or renal failure patients, respiratory such as bronchial asthma, bronchiolitis, and chronic obstructive pulmonary disease, and endocrine such as diabetes mellitus are challenge for dentists.[7]

Age is considered a risk factor for a large number of diseases, injuries, hospitalization, length of hospitalization, and adverse drug reactions. Moreover, aging can influence nearly all parts of the body.[8] The effects of aging on major organ systems can be summarized as follows: (1) Changes in structure, function, metabolism, and blood flow in the aging brain, which may cause cognitive impairments, most frequently episodic memory changes, as well as an increased risk of hallucination in acute cases. Root canal treatment is a multistep procedure which requires the use of airotar, where there is excessive aerosol production.[9] The present study was conducted to assess the prevalence of apical periodontitis and root canal treatment among elderly and medically compromised patients.

In the present study, Group I comprised 80 males and 70 females and Group II had 85 males and 65 females. Sharma *et al.*[10] conducted a study on 100 subjects to record the prevalence of apical periodontitis among elderly and medically compromised patients. They were divided into two groups of 50 subjects each with 25 males and 25 females in each group. Group I was medically compromised and Group II was healthy patients. There was a highly significant relationship between the presence of more than 1 periapical lesions and medically compromised subjects. There was more number of subjects in the control group having 1 periapical lesion with at least one obturated tooth.

We found that 79 diabetic, 47 cardiac, and 99 renal and respiratory patients had apical periodontitis. Group I had 95 and Group II had 60 patients with more than 1 periapical lesion. Group II had 110 and Group I had 48 patients with 1 periapical lesion with at least one obturated tooth. The difference was significant ($P < 0.05$). There was non-significant difference between Groups I and II with more than 1 periapical lesions with at least one obturated tooth ($P > 0.05$).

In asthmatic patients, if a patient suddenly shows that the symptoms of acute asthmatic attack, maintain the airway open and deliver agonists with inhaler or nebulizer, and provide oxygen supply through face mask nasal hood or cannula. A care should be taken to limit the long procedures.[11]

We observed that more than 1 periapical lesion was seen more in renal and respiratory patients (45), 1 periapical lesion with at least one obturated tooth was seen more one

diabetic patients (22). The difference was non-significant ($P > 0.05$). Castellanos-Cosano *et al.*[12] recorded the prevalence of apical periodontitis and endodontic treatment in liver transplant candidates (LTC) and control healthy subjects. It comprised 42 LTC and 42 controls. It was found that radiographic signs of AP in one or more teeth were found in 79% of patients in the study group and 50% of control subjects. One or more root-filled teeth (RFT) were found in 19% and 62% of the study and control subjects, respectively. Among LTC patients, 14.7% of the teeth had AP, whereas, in the control subjects, 4.2% of teeth were affected. The percentage of RFT in the study and control groups was 1.5% and 6.8%, respectively.

CONCLUSION

The authors found that medically compromised patients have more periapical lesions with radiographic evidence. They have a lower frequency of obturated teeth than healthy subjects.

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Original Article

Functional Outcome of Complex Tibial Plateau Fractures Using Hybrid External Fixators

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Abstract

Introduction: Tibial plateau fractures are associated with communition and soft tissue injury and are usually managed with ORIF (Open Reduction and Internal Fixation). The hybrid external fixer helps to reduce the associated complications by allowing early mobilization and weight bearing, minimal soft tissue damage, and stable fixation. In this study, we assessed the complications, clinical outcome scores, and postoperative range of knee movements associated with Schatzker type 5 and 6 tibial fractures.

Aim: To study the functional outcome and role of hybrid external fixators in complex tibial plateau fractures**.**

Methods: The study included 75 patients with Schatzker type 5 and 6 fractures who underwent open/close reduction with a hybrid external fixator. Informed consent was obtained from all the patients and a 2 months post-operative follow-up was done. The analyses were performed with NEER's RATING SYSTEM FOR KNEE.

Results: The mean age of the patients was 51.28±14.28 years and a male predominance prevailed. RTA accounted for 68% of the fractures and with hybrid external fixator, excellent results were achieved in 60% of the cases. knee stiffness, pin site infection, malunion and limb shortening were the associated complications.

Conclusion: A promising alternative therapy for high-energy plateau fractures is a hybrid external fixator. It permits a safe fixation of fraction fragments, early joint recovery and the treatment of related soft tissue injuries with minimum complication rates.

Key words: Hybrid external fixation, complex tibial fractures, NEER's score, compound fracture, Schatzker type 5 and 6.

INTRODUCTION

Complex tibial plateau fractures pose a therapeutic dilemma by presenting with significant articular and soft tissue damage. These high energy injuries are a threat to the major weight bearing joint. The management of these injuries is challenging to the orthopaedic surgeon as the restoration of the articular surface, joint stability, and axis are a complex procedure. In addition, associated soft tissue damage may further increase the complexity of the treatment [1,2]. The conventional approach to these fractures was an open reduction of the fragments and internal fixation with plates and screws. This was associated with increased risk of wound complications and decreased or impaired functional range of movements of the associated joint. This led to the development of alternate methods of fixation like Ilizarov ring fixation, external fixation with limited internal fixation and hybrid external fixation[3]. These procedures have an advantage of early joint motion and stable fixation.

Road traffic accidents and fall injuries are the most common causes of high impact fractures and young middle-aged males are the most affected population. It can lead to prolonged disability and has a significant socio-economic effect in this population. Literature indicates that only 50% better results are achieved with closed or open surgical techniques[4]. Ordinary external fixators may lead to knee stiffness and are not suitable for type 5 and 6 fractures. ORIF, which was the attractive treatment method since 1990s, reduces the articular surfaces well but does not protect the surrounding soft tissue[5,6]. The advantage of hybrid external fixator is that it protects the soft tissue envelope and allows access to the soft tissue cover during treatment. Additional stability can

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be attained with the use of cannulated screws and K-wires which will allow for early knee mobilization.

The aim of our study was to find out the functional outcomes after treatment with hybrid external fixators, with open reduction and closed reduction techniques by comparing the pre- and post-operative radiographs.

Aim

To study the functional outcome and role of hybrid external fixators in complex tibial plateau fractures.

MATERIALS AND METHODS

This prospective study was conducted in Department of Orthopaedics, Thanjavur Medical College, Thanjavur during the time period June 2018 to July 2019. Patients over 20 years of age and with fractures of the closed Tibial plateau (Schatzker type 5 and type 6) (grade I to grade III B) were included in the study. Patients of age<than 20 years, those with co-morbid conditions, shut-off shallow board fractures (Schatzker 1-4), compound grade IIIc shallow board fracture and floating knee and pilon fractures were excluded from the study. The fractures were treated with either closed reduction and hybrid external fixation or with minimal open reduction and a hybrid system. The patients were allowed to walk with walker's support with touch toe after reduction of symptoms. After 2 weeks, partial weight bearing walking with the help of walker was started and full-weight bearing walking with walker support was allowed at 6 weeks after surgery. Radiographic analysis showed fracture reunion at the end of 6 weeks. The Fixator was removed, and PTB cast was added to allow the patient to bear full weight. The PTB cast was removed after 2 weeks followed which the patients were advised to begin walking with a walker and to discard the walker gradually. Functional outcomes were assessed using NEER's rating score.

RESULTS

A total of 75 patients were included in the study of which 54 were males and 21 were females. The mean age of the patients was 51.28±14.28 years. 68% of the fractures were due to road traffic accidents and a majority of the cases (60%) were Schatzker type-6 high energy fractures of the tibial condyle. According to Neer's score rating system for knee, 60% patients had excellent and 29% patients had good outcome. 5% of patients had fair outcome and only 4% had poor outcome [Figure 1]. Out of the 75 cases, 30 cases were Type 5 and 45 cases were Type 6 Schatzker, and the average Neer's scoring for them was 18.25 and 13.50, respectively [Table 1]. 27 cases of closed fracture and 48 cases of compound fracture which were treated by hybrid fixator showed average Neer's score of 16.85 and 13.86, respectively [Table 2]. The most common complication was knee stiffness (11%) followed by pin site infection (8%), that was overcome by regular dressing. Knee stiffness was managed by physiotherapy [Figure 2]. Wound infection was seen in 4% of the cases. Malunion and limb shortening was observed each in 3% of the cases.

DISCUSSION

The management of complex tibial plateau fractures is challenging and there is no clear consensus to the ideal treatment method till date. The treatment modality may vary

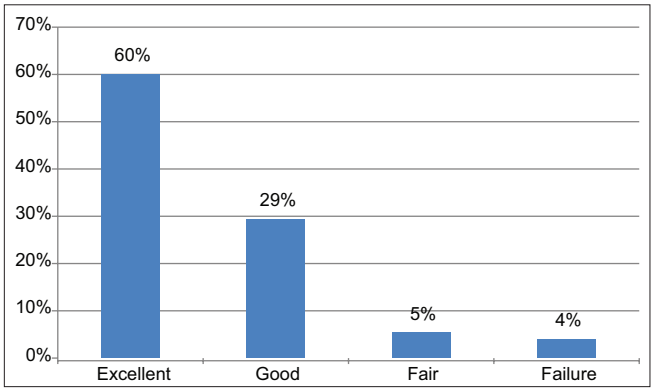

Figure 1: Distribution of NEERs Score

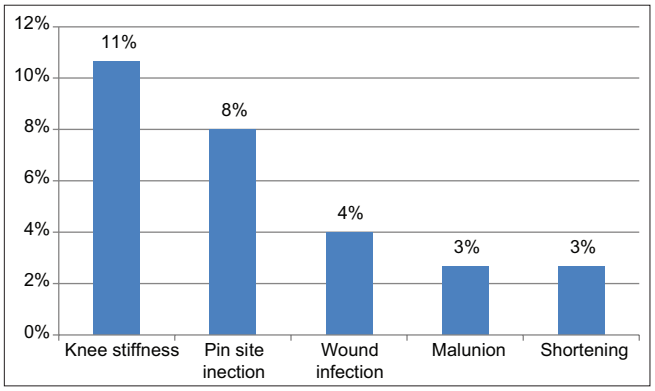

Figure 2: Complications

Table 1: NEER's Rating Score according to Schatzker's type

Schatzker's type	Number of cases	Average NEER's rating score
Type 5	30	18.25
Type 6	45	13.50

Table 2: Results based on type of fracture (closed /open)

Fracture	Number of cases	Average Neer's rating score
Closed fracture	27	16.85
Compound	48	13.86

from surgeon to surgeon. Review of literature suggests that open anatomical reduction of the articular surface is the gold standard for treating these injuries. Studies over the last 10 years suggest that minimally invasive or closed reduction with ring or hybrid external fixation is a safer equivalent to ORIF method for treating Schatzker Type V and VI fractures[7,8]. Extensive soft tissue damage may be associated with these fractures and maintaining their integrity plays a vital role in fracture healing. The average fracture healing time ranges from 6 to 10 weeks and preservation of the fracture haematoma aids in early reunion. Factors like the type of fracture and presence of infection may interfere with the healing process. Good anatomical reduction and stable fixation can reduce the complications and also has early rehabilitatory effects[9,10]. Studies show that these effects can be achieved with the use of hybrid external fixators.

Hybrid external fixators are easy to use and they have been used for the management of complex and compound tibial condyle fractures in the recent years. The procedure is also associated with lower blood loss compared with ORIF for plating and can minimize skin necrosis. Avoiding skin necrosis is an inevitable factor in these injuries as that could be an issue in the proximal tibia, that offers space for covering skin/flats in cases of skin loss/bone exposed compound fractures[11]. In our study, excellent results were achieved in 60% of the cases and good outcome in 29% cases with the use of hybrid external fixator as per NEER scoring system of knee. A 4% failure rate was observed in our study. An average NEER score of 18.25 and 13.50 were found in Type 5 & 6 Schatzker fractures respectively. This shows that the functional outcomes were slightly better in type-5 fractures than the latter. The average NEER score with closed fracture was 16.85 and with compound fracture was 13.86, indicating that the results were better in case of close fractures.

As with any other procedure, a few complications were associated in our study but were minimal or insignificant. The most common complication was knee stiffness (11%) followed by pin site infection (8%). Wound infection, malunion and shortening of the limb were the other complications noticed. But the symptoms reduced and the patients were able to walk without walker's support at the 6th post-operative week. The complications were managed by physiotherapy and proper wound dressings. Our study results are similar to the study findings of Krupp *et al.* In his study too, an early fracture reunion was observed with the use of hybrid external fixator[12]. The role of external fixators, either half-pin or ring and wire, has been evaluated in various studies of complex tibial plateau fractures, and quite encouraging results have emerged. Several authors have reported good results using a hybrid or circular frame combined with minimal open reduction and percutaneous screw fixation. The limitation of the study is the shorter follow-up time that did not allow for long-term outcome assessment.

CONCLUSION

A promising alternative therapy for high-energy plateau fractures is a hybrid external fixator. Without high complication rates, it permits a safe fixation of fraction fragments, early joint recovery and the treatment of related soft tissue injuries. The outcome was better in Type 5 and closed fractures than in type 6 and compound fractures respectively in this study. More studies to ensure optimal functional recovery and patient satisfaction are needed.

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Original Article

Functional and Radiological Outcome of Displaced Intra-Articular Calcaneal Fractures

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Abstract

Introduction: Calcaneal fractures account for 1-2% of all the fractures and may be associated with increased disability in young and middle age group. The management of these fractures are challenging and this study assesses the clinical and radiological outcomes of displaced intra articular calcaneal fractures treated by open and closed reduction techniques.

Aim: To analyse the functional and radiological outcomes of displaced intra-articular calcaneal fractures.

Methods: A total of 26 study patients were and followed during the time period June 2018 to July 2019 in Department of Orthopaedics, Thanjavur Medical College, Thanjavur. Patients between the age group 18-65 years and those with B/L and unilateral calcaneal fracture sander's fracture classification type -2, 3 & 4 and injury less than 3 weeks were included in the study. Institutional ethics committee clearance was obtained and informed consent was taken from all the study patients before the study.

Results: The mean age was 46.28 years and males were more commonly affected. The results were best in the ORIF group with a mean AOFAS score of 81.24 and inferior in the CRIF with k wire group with a mean AOFAS score of 68.75. The cancellation screw group showed better results than the k-wire group but worse than the ORIF group.

Conclusion: The functional outcomes were best in the ORIF group and the minimally invasive techniques achieved a fair outcome and ankle functionality clinically and radiographically.

Key words: Calcaneus, ORIF, CRIF, AOFAS, Subtalar joint, Böhler's angle

INTRODUCTION

The most frequent injuries of the tarsal bone are Calcaneal fractures, and account for 1–2 % of all fractures in the human body. Their annual incidence is 11.5 fractures per 100,000 people[1,2]. Males between 20-29 years are the most commonly affected population. The sequelae of DIACFs (displaced intra-articular calcaneal fractures) are disabling conditions and this poses a significant socioeconomic burden, as the affected population are mostly youth and middle-aged male workers[3]. Diabetes, osteoporosis, autoimmune disorders and injury are all the associated risk factors. Fall from a height with the heel hitting the ground causes 70% of the intra-articular calcaneal fractures that involves the subtalar joint.

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The management of Calcaneal fractures poses a challenge to the orthopaedic surgeon due to low level of evidence. Fracture reconstruction and improvising the fracture healing with the surrounding tissues is a major problem. The goal of a valuable surgical treatment is achieving a 3-dimensional anatomy of the calcaneum and many techniques have been identified in the recent years to accomplish this goal. Sanders computerized tomography (CT) classification and the Böhler angle measurement are the available useful diagnostic tools[4,5]. Studies have been done about the conservative management of these fractures but the results were not satisfactory. The most widely accepted surgical technique is open anatomic reduction and internal fixation through the extended lateral approach which permits good and wide visualization of the subtalar joint[6]. Minimally invasive procedures may be associated with incomplete reduction and fixation in cases of complex fractures. Studies report the loss of reduction

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and inadequate restoration with cancellous bone screws and K-wires[7].

This may arise the need for additional open surgery leading to wound necrosis, increased hospitalization and delayed rehabilitation. This study analyses the functional and radiological outcomes of DIACF with open and closed reduction techniques.

Aim

To analyse the functional and radiological outcomes of displaced intra-articular calcaneal fractures.

MATERIALS AND METHODS

An observational study was conducted among 26 study patients in Department of Orthopaedics, Thanjavur Medical College, Thanjavur during the study period June 2018 to July 2019. Parameters like sex distribution, age distribution, mode and type of injury (based on sander classification), site of involvement, timing of surgery, radiological analysis, ankle-foot alignment, range of movements, bone grafting and type of surgery to analyze the functional and radiological outcome of intra-articular calcaneal fractures treated by open/closed reduction method were studied. Patients between the age group 18-65 years and those with B/L and unilateral calcaneal fracture sander's fracture classification type -2, 3 & 4 and injury less than 3 weeks were included in the study. Patients not willing to participate in the study, age>65 years, sander's classification type-1 fracture, medical contraindications and injury greater than 3 weeks were excluded. The study began after obtaining informed consent from the study patients after ethical clearance from the Institutional Ethics Committee. Proper and timely follow up was done and the observations were documented. The pre-operative and post-operative radiographic images were analysed and fractures were classified. Data were statistically analysed and the results were discussed.

RESULTS

Of the 26 patients, 18 patients were males and 8 patients were females. The mean age of the patients is 46.28 years. A total of 31 fractures was observed of which 18 cases were fixed with ORIF (open reduction & internal fixation) with PO, 5 with CRIF (closed reduction & internal fixation) with cancellous screw fixation and 8 cases with CRIF with k-wire fixation [Table 1]. The mean AOFAS score in patients who underwent surgery within 5 days following an injury was 82±6.2 and 78±15.2 in those who underwent surgery between days 6-10. The score was 69±6.1 in those who underwent surgery after 10 days of initial injury [Table 2]. There were 18 fracture fragments in the first group, those who underwent ORIF with PO and 5 fragments in the 2nd group (CRIF with cancellous screw fixation) an d8 fragments in the 3rd group (CRIF with k-wire fixation) Table 3. The surgical outcomes were good in 27 fracture fragments and fair in 4 fragments Table 4. 4 cases reported with wound dehiscence 1 fracture site with wound infection. 26 cases did not have any post-surgical complications [Table 5].

DISCUSSION

Fractures of the calcaneum are the commonest of the tarsal bone fractures and the prognosis for intra-articular fractures may vary. The management and choice of treatment of intra-articular calcaneal fractures still remains controversial. Hedge and his associates found in their study that the patient distribution was equal in the age groups 30-39, 40-49 & 50-59 years[8]. The mean age of fracture occurrence in our study was 46.28 years. Calcaneal fractures may vary depending on the age and mechanism of trauma. Mitchell *et al.*in his study said that most of

Table 1: Cross-tabulation between fracture and surgical procedure

S.No	Procedure	Number of fractures
1	ORIF with PO	18
2	CRIF with cancellous screw fixation	5
3	CRIF with k-wire fixation	8
	Total	31

Table 2: Cross-tabulation between the timing of surgery and mean AOFAS

S.N0	Timing of surgery	Mean aofas
1	<5 days	82±6.2
2	6-10 days	78±15.2
3	>10 days	69±6.1

Table 3: Cross-tabulation between procedure and AOFAS

S. No	Procedure	Number of fragments	Aofas score (mean)
1	ORIF with PO	18	81.24
2	CRIF with cancellous screw fixation	5	79.57
3	CRIF with k-wire fixation	8	68.75
	Total	31	

Table 4: Cross-tabulation between no. of patients and outcome

S.No	Outcomes	Number of patients
1	Good	27
2	Fair	4
3	Total	31

Table 5: Cross-tabulation between patients and complications.

S.No	Complications	Number of patients
1	No	26
2	Wound dehiscence	4
3	Wound infection	1

the fractures were due to fall from a height and males were at increased risk of injury[1]. In our study too, more number of males were affected than the females. Out of the 31 fracture fragments, 18 underwent ORIF with PO. The management of DIACF is challenging to the orthopaedician due to the complex anatomy of the tarsal bones and delicate surrounding soft tissue which can act as barriers to treatment[9]. Open reduction technique with an extended lateral approach and L- shaped incision provides better visualization of the fracture site and also protects the sural nerve and has been widely accepted for decades.

But there was a concern of post-surgical complication associated with this procedure. Bezes *et al.* in his study reported a 10% wound necrosis among 257 fractures using this approach[10]. Buckley *et al* and Folk *et al* also reported similar wound complications in their study. Biz and his team reported that no significant differences were found between populations treated with ORIF, screws, and K-wires but the best functional and radiological outcome was associated with ORIF group, which is considered as a gold standard for treatment of calcaneal fractures[11]. In our study too, the best AOFAS scores (81.24) were observed in the ORIF with PO group. The long-term pain and regaining of function was best achieved in this category but this technique is criticized for the complications associated. One out of 31 fractures presented with wound infection and 4 fractures with wound dehiscence. But the long-term results were good in 27 fractures.

We also observed in our study that the AOFAS score correlated with the timing of surgery. Better AOFAS score (82±6.2) was observed in cases treated within 5 days of the injury. This finding is concurrent with the study findings of McReynolds/Burdeaux who stated that prolonged wound exposure and delayed operating time may increase the chances of wound complications[12,13]. A normal range of Böhler's angle was observed in radiograph in most of the patients in ORIF group in our study. Optimal outcomes were achieved with CRIF with cancellous screw fixation with a mean AOFAS score of 79.57. In this study, the least functional outcome was seen in the CRIF with k wire fixation group. The limitations of this study are the small sample size and the non-randomized structure.

CONCLUSION

Our data showed that the ORIF group patients presented with superior radiographic and functional outcomes when compared to the two other groups. The timing of surgery also plays an important role in achieving a good functional outcome. The results were optimal in CRIF with cancellous bone screw fixation and least in CRIF with k-wire fixation. ORIF with PO may be associated increased with wound dehiscence and wound infections. Minimally invasive procedures can be used as an alternative to the conventional open reduction technique where there is a need to reduce post-operative complications.

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Original Article

Ultrasound Guided Genicular Nerve Block for Knee Osteoarthritis – Comparing Methylprednisolone and Triamcinolone with Ropivacaine- Randomized Prospective Double Blinded Study

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Abstract

Introduction: Chronic knee osteoarthritis (OA) commonly affects elderly population and is characterized by severe pain, joint stiffness and disability in using the joint. OA is a leading cause of disability worldwide. Genicular nerve block is effective procedure for chronic OA knee.

Aim: This study is to compare Triamcinolone and Methylprednisolone acetate with local anesthetic during ultrasound guided genicular nerve block (GNB) for knee OA.

Methodology: 50 patients were randomly divided into 2 groups. Group–A, 25 patients received 6ml of 0.5% Ropivacaine with 60mg Triamcinolone and Group–B, 25patient received 6ml of 0.5% Ropivacaine with 60mg Methylprednisolone. VAS score and oxford knee score were assessed at baseline, 1, 2, 4 and 8 week intervals.

Results: The difference in VAS score between two groups were statistically insignificant (p value >0.05). Onset of drug in group A was 122.35±10.5 and group B was 117.9±15.4, which was statistically insignificant (p value >0.05). Oxford knee scoring in Group A was 30.1±1.4 and in Group B was 29.7±2.1, which was statistically insignificant (p value >0.05).

Conclusion: While considerable pain relief was achieved in all patients, the efficacy of both the drugs in chronic osteoarthritis is similar. Depending on patient factors either drug can be used in chronic osteoarthritis for pain relief.

Key words: Chronic knee osteoarthritis, Genicular nerve block, Methylprednisolone acetate, Triamcinolone

INTRODUCTION

Chronic osteoarthritis knee (OA) tends to affect elderly people and is characterized by severe pain, joint stiffness, and disability. Chronic osteoarthritis knee is often not effectively managed with prescribed medications.[1] Total knee joint arthroplasty may be a successful surgical option for cases that fail to respond to conservative treatments. However, surgery is associated with increased morbidity and mortality among patients with chronic knee OA, and its use is limited in high-risk patient with comorbidities.[2] Patients with chronic knee pain that has failed to respond to conservative care may be candidates for a genicular nerve block. This procedure is based on a theory that blocking the nerve supply to a painful area may alleviate pain and restore function. The knee joint is innervated by the articular branches of various nerves, including the femoral, common peroneal, saphenous, tibial, and obturator nerves. These branches around the knee joint are known as genicular nerves. Several genicular nerves can be easily approached with a needle under fluoroscopic guidance. Patients can get a diagnostic genicular nerve block to determine if this will provide adequate relief.A Genicular nerve block is a procedure where these nerves are anesthetized with local anesthetic injected through small needles. It generally takes 5 to 10 minutes for the procedure.[3]

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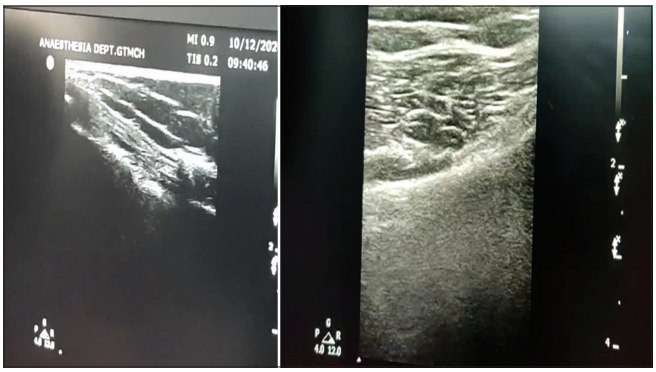
Therefore, in the present study, we aim to evaluate the efficacy comparing Triamcinolone and Methylprednisolone acetate with local anesthetic during ultrasound guided genicular nerve block (GNB) for knee OA.

METHODS

After approval by the institutional Ethics Committee, 50 patients were selected for this study. The patients included were between 40 to 70 years, both sexes, having grade II osteoarthritis knee whose pain duration more than 2 months. Patient who underwent prior knee surgery, morbidly obese (BMI>35kg/m2), who has connective tissue disorder, prior steroid injection within past 3 months, ASA III & IV categories and patient on anticoagulation medication were excluded from study.

Among the 50 patients selected, 48 patients were randomised using computerised randomization after excluding the patients with exclusion criteria. The randomised patients gave their informed, written consent to participate in this study. Group-A patients receiving 6ml of 0.5% Ropivacaine with 60mg Triamcinolone and Group- B patients receiving 6ml of 0.5% Ropivacine with 60mg Methylprednisolone.

No premedications or sedatives were used. The patients were asked to stop all analgesic medication before procedure. Patient placed in supine position with pillow under the popliteal fossa to alleviate discomfort. High frequency linear probe 5-12MHZ placed parallel to long bone shaft and moved up or down to identify the epicondyle of the long bones. The genicular arteries were identified near the periosteal areas, which are the junctions of the epicondyle and the shafts of the femur and tibia.



Accordingly, GNB target points should be next to each genicular artery because the superior lateral, superior medial and inferior medial genicular artery traveled along with each genicular nerve.

The infero lateral area was spared because of associated peroneus muscle weakness which was responsible for plantar flexion and eversion of foot. After confirming the artery location, 22G needle inserted and tip placed next to genicular artery, a gentle aspiration performed and Group A received 2ml of 0.5% Ropivacaine with 20mg of triamcinolone and Group B received 2ml of 0.5% Ropivacaine with 20mg of methyl prednisolone acetate (depot) injected at 3 separate targets.

After the procedure, all of the patients were advised to continue using any previously prescribed medications when their symptoms were persisted, whereas, they were advised to stop or reduce current medication when their symptoms were alleviated. The patients were prohibited any additional medications or physiotherapy regimens at the 8-week post procedure period.

Before each procedure, the patients were instructed in the use of a visual analog scale (VAS) (range: no pain to unbearable pain) and Oxford Knee Score and baseline values were obtained.

OKSs were based on self-administered, joint-specific 12-item questionnaires. Each question was scored from 1 to 5, with one representing either the best outcome and/or the fewest symptoms. The scores from each question were summed to yield overall scores ranging from 12–60, with 12 representing the optimal outcome.

Outcome measure were assessed according to hospital visits at baseline and at 1,2,4 and 8 weeks after the procedure.

The statistical analysis used in this study were mean, standard deviation and Fisher's exact test was used. The data analysis was performed using SPSS Version 11.0

RESULTS

The demography data as per the Figures 1 and 2 shows that there is no much difference the age and sex distribution between two groups, thus not affecting the results of the study. The VAS score in Group A is 2.8±0.7 and Group B is 3.2±0.5. The difference in VAS score between two groups were statistically insignificant (p value >0.05) [Figure 3]. Onset of drug in group A was 122.35±10.5 and group B was 117.9±15.4, which was statistically insignificant (p value >0.05) [Figure 4]. Duration of action in Group A was 12.1 and in Group B was 15.4 [Figure 5]. Oxford knee scoring in Group A was 30.1±1.4 and in Group B was 29.7±2.1, which was statistically insignificant (p value >0.05) [Figure 6].

DISCUSSION

When performing GNB under ultrasound guidance,we used the genicular arteries as landmarks. The proportion of successful responders between the 2 groups during the follow-up period. Superior lateral, superior medial, and inferior medial genicular arteries were easily identified by color Doppler at the junctions of the epiphysis with the shaftsof the femur and tibia. Some studies have shown that genicular nerves were visible alongside the genicular arteries on ultrasound scans.[4,5] In this study, we verified that those nerves were distinguishable usingthe same ultrasound method. However, thegenicular nerves might frequently be unidentifiable via ultrasound. As the genicular nerves mostly travelled along the arteries, the GNB targets should be placed next to each genicular artery, regardless of genicular nerve visualization. Accordingly, the present study demonstrated that GNB could be successfully performed under ultrasound guidance, thus corroborating other ultrasound-based studies.[5,6] Although the addition of TA to Ropivacaine during GNB doesn't appeared to yield superior relief of knee pain upto 4 weeks after the procedure compared to GNB with Ropivacaine and triamcinolone, clinically significant knee pain relief was only sustained for 2 weeks after reassessing VAS scores according to the concept of a minimal clinically important improvement for the intermediate base score tertile in a prior study (change in VAS scores > 27.4 mm). However, after reassessing the OKSs according to the minimal important changes, with reference to a prior study (change in OKS> 9 points), the clinical improvements in functional

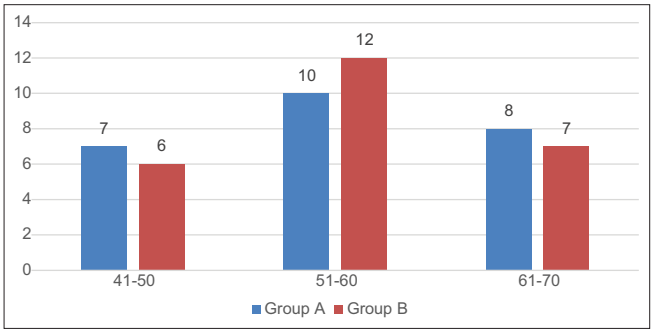


Figure 1: Age distribution

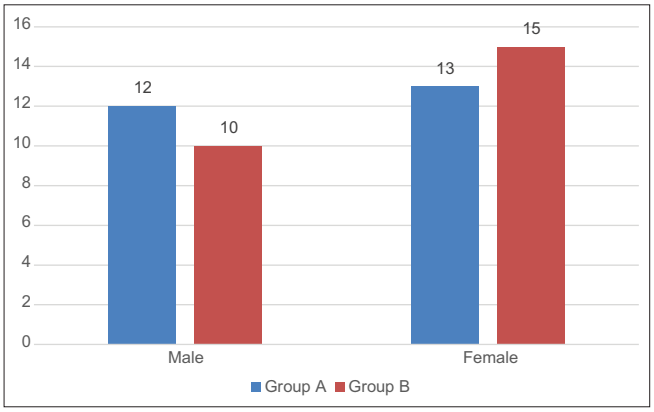


Figure 2: Sex distribution

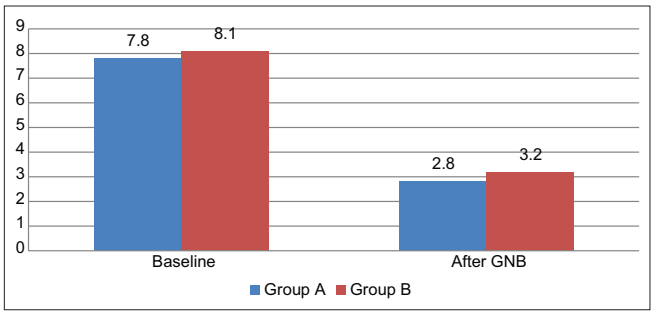


Figure 3: VAS Score

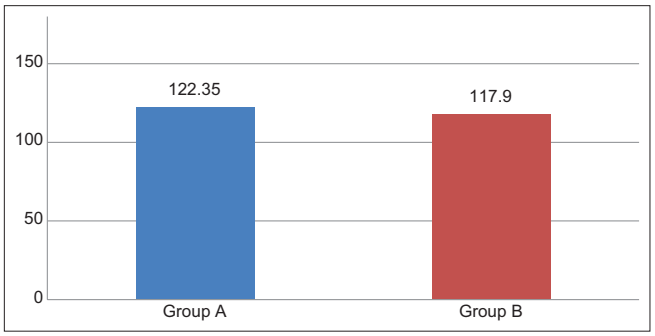


Figure 4: Onset Of Action

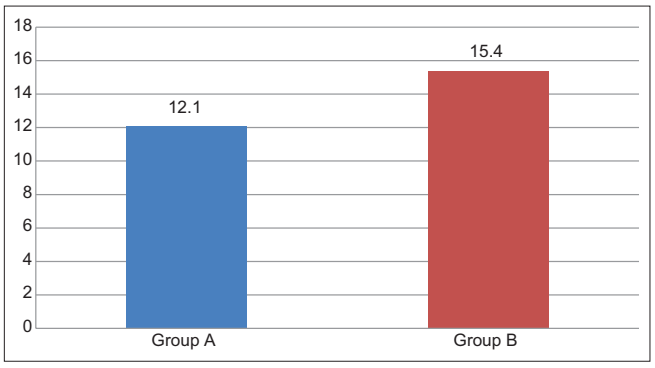


Figure 5: Duration Of Action

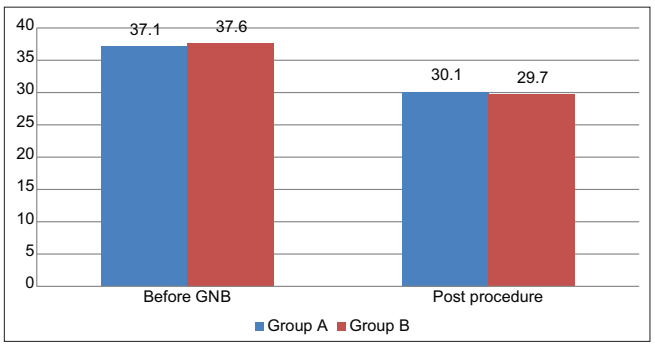


Figure 6: Oxford Knee Scoring (OKS)

capacity only persisted for one week in both groups. Moreover, there were no significant successful responders and MQS in both the groups at only 2 weeks after the procedure. Therefore, the addition of corticosteroid therapy to ultrasoundguided GNB under a local anesthetic might not provide significant benefits when compared to GNB with a local anesthetic with methyl prednisolone.

This study had several limitations that warrant consideration. First, we did not evaluate the postprocedural plasma cortisol concentrations. An injection of steroidsinto an epidural space can suppress the pituitary axissystem in a dose-dependent manner. Although we used a single 20 mg dose of TA, cortisol depression might still have occurred in some patients. Additionally, the optimal steroid type or dose is unknown, and a different dose or type might have yielded different results.

CONCLUSION

While considerable pain relief was achieved in all patients, the efficacy of both the drugs in chronic osteoarthritis is similar. Depending on patient factors either drug can be used in chronic osteoarthritis for pain relief.

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Original Article

Oral Fibreoptic Intubation – A Comparison of Simple Pre-Determined Length Insertion Technique (Split) With Conventional Method: A Randomized Cross-Over Study

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Abstract

Introduction: The flexible fiber-optic bronchoscopy (FOB) guided tracheal intubation remains the gold standard in difficult airway management in spite of many newer airway gadgets. FOB-guided intubation can be performed through nasal or oral route either in awake or anaesthetised patients.

Aim: To evaluate the simple pre-determined length insertion technique (SPLIT) during oral fibreoptic intubation.

Methods: In this randomized cross-over study 18 - 65 years, ASA 1 and 2, Patients undergoing general anaesthesia patients were included. Video-assisted flexible fiber-optic laryngoscopy was performed using SPLIT (Group-A) (n-30) and by using conventional method (Group-B) (n-30). Introduction of fiberscope from the incisors to the visualization of glottis (T1), Time taken from the visualization of glottis to the passage of fiber-optic tip just beyond glottis (T2), Time from the incisors to pass it beyond the glottis (T3), were noted.

Results: T1 is reduced in SPLIT (12 ± 1.58 sec) when compared to conventional method (43 ± 1.68 sec) and is statistically significant ($p< 0.0001$).T2 is equal in SPLIT (11 ± 1.23 sec) and conventional method (12 ± 1.47 sec) which is statistically insignificant ($p>0.05$). T3 is reduced while using SPLIT (13 ± 2.03 sec) when compared to conventional method (55 ± 1.57 sec) and is statistically significant ($p< 0.0001$).

Conclusion: SPLIT significantly lessened the time to visualize the glottis than the conventional technique. The SPLIT can be used as a preferred technique to secure the airway at the earliest and also as an alternative to conventional technique.

Key words: Conventional technique, Oral fiberoptic intubation, SPLIT

INTRODUCTION

The flexible fiber-optic bronchoscopy (FOB) usage remains the gold standard in difficult airway management in spite of many newer advancements. FOB guided intubation can be performed either in awake or anaesthetised patients through nasal or oral route. The visualisation of the glottis with fiberscope, visualising the carina by passing the fiberscope beyond the glottis and railroading the endotracheal tube over the fiberscope into the trachea are the usual steps in fiber-optic intubation. Jaw thrust, lingual traction, fiberoptic assisting airway devices and laryngoscopy assisted fiber-optic intubation have been employed for easy way of fiber-optic intubation.[1,2] None of them has been found to be individually effective to improve the glottic visualisation while the combination offers a better outcome on most occasion. Usually, FOB is performed by negotiating the fiberscope from the incisors and identifying the airway structures until the glottis.[3] On the contrary, the FOB could also be advanced to a fixed distance to facilitate the glottic visualisation. This alternative technique had successfully reduced the time

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needed for glottic visualisation through the nasal route.[4] However, this technique has not been evaluated in the oral flexible fiber-optic intubation. Hence this study is done by inserting the fixed length of FOB during oral flexible fiber-optic intubation. The predetermined length was calculated from the angle of mouth to tragus of the ear.[5] The primary aim of this randomised crossover trial was to compare the time to visualise the glottis and time to pass beyond the glottis in conventional versus the simple predetermined length insertion technique (SPLIT).

METHODS

This randomised crossover trial was conducted in Govt Theni medical College after obtaining approval from the institutional research and ethics committee. Those patients with age between 18 and 65 years belonging to the American Society of Anesthesiologists physical status 1 and 2 undergoing general anaesthesia was included in the study. Patients with gastro-oesophageal reflux disease anticipated difficult airway, pregnancy, abdominal distension, maxillofacial trauma and known allergy to anaesthetic drugs were excluded from the study. A total of 74 patients were selected for the study and after applying the exclusion criteria 60 patients were randomised. Written informed consent was obtained from all patients included in the study. After preanesthetic evaluation on the previous day, the patient was explained about the procedure. In the preanesthetic room, Inj. glycopyrrolate (0.2 mg) was administered. The patient was nebulised with Inj. 4% Lignocaine 3ml 10 min before the procedure. The randomisation was done using the computer-generated random number list and lot method. They were grouped into two groups. Video-assisted flexible fiber-optic laryngoscopy was performed using SPLIT (Group-A) (n-30) and by using conventional method (Group-B) (n-30).

In the operation room, standard monitors were established, and baseline parameters were noted. After adequate preoxygenation, all were administered fentanyl (2 μg/kg) and midazolam (1 mg) intravenously. Then the patient remained breathing spontaneously with oxygen and sevoflurane. Video-assisted flexible fiber-optic laryngoscopy was performed. In Group A, Predetermined length - calculated from the angle of mouth to tragus of the ear. The measured length is marked in the fiberscope using a marker. The fiberscope was inserted in the midline initially to the marked length of the fiberscope and anteflexion of the tip was done. After glottic visualisation, the scope was negotiated and passed beyond the glottis to visualise the carina. After visualising the glottis the endotracheal tube was railroaded and intubation completed. The further anaesthetic management is carried out as per the institutional protocol. In Group B, the video-assisted flexible fiber-optic laryngoscope was introduced through the oral cavity. The fiberscope was negotiated from the carina step by step by identifying the airway structures and then the glottis. After glottic visualisation and passing the fiberscope beyond the glottis to visualise the carina and intubation performed. The observed parameters include the time taken from the introduction of fiberscope from the incisors to the visualisation of glottis (T1), time taken from the visualisation of glottis to the passage of fiber-optic tip just beyond glottis (T2), time from the incisors to pass it beyond the glottis (T3), pre-determined length, The timings were noted by a resident who was not directly involved in the study. Desaturation or laryngospasm during the fiber-optic procedure was treated with 100% O2 and positive pressure ventilation.

The sample size was calculated from the previous study using an alpha level of 0.05 and a power of 80% using two samples mean test in Open Epi software.

RESULTS

The statistical methods used in this study are mean, standard deviation and unpaired t test for comparing the time duration between SPLIT and conventional technique. The demographic parameters were shown in the Figures 1 and 2 which showed no significant difference between male and female sexes and in the age groups which were almost equally distributed. T1 - Time taken for introduction of fiberscope from the incisors to the visualization of glottis is reduced in SPLIT (12 ± 1.58 sec) when compared to conventional method (43 ± 1.68 sec) and is statistically significant ($p < 0.0001$). T2 - Time taken from the visualization of glottis to the passage of fiberoptic tip just beyond glottis is equal in SPLIT (11 ± 1.23 sec) and conventional method (12 ± 1.47 sec) which is statistically insignificant ($p > 0.05$). T3 - Time from the incisors to pass it beyond the glottis ie. the total time for fiber-optic intubation is reduced while using SPLIT (23 ± 2.03 sec) when compared to conventional method (55 ± 1.57 sec) and is statistically significant ($p < 0.0001$) [Table 1]. Thus the time for intubation with SPLIT was very much reduced when compared to conventional method. The most probable reason is that the cut short of time by introducing the fiberscope from the incisors to the glottis in a single step.

DISCUSSION

From this study, it is evident that, the time for intubation with SPLIT was very much reduced when compared to conventional method. The most probable reason is that the cut short of time by introducing the fiberscope from

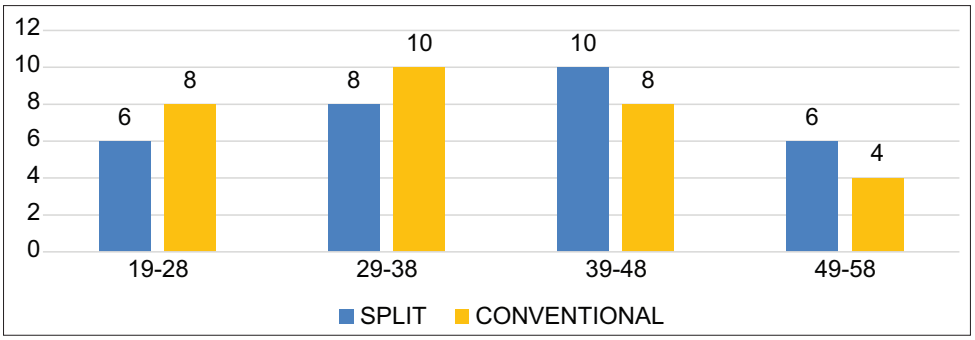

Figure 1: Age distribution

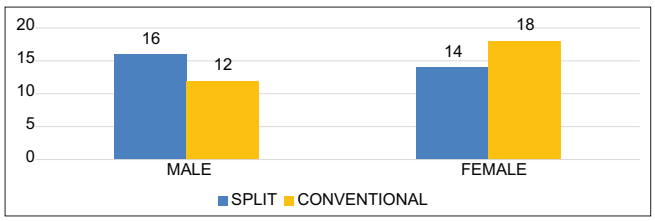

Figure 2: Sex distribution

Table 1: Time duration comparison between SPLIT and conventional technique and *P* value

Time duration (sec)	SPLIT	Conventional technique	*P* value
	Time (sec) (mean±SD)		
T1	12±1.58	43±1.68	<0.0001
T2	11±1.23	12±1.47	>0.05
T3	23±2.03	55±1.57	<0.0001

the incisors to the glottis in a single step. While in the conventional method as there was a delay in negotiating the fiberscope from the incisors to the glottis, the time is prolonged. Moreover after reaching the glottis, the time for fiberscope to pass beyond the glottis to visualize the carina is equally distributed between the SPLIT and conventional technique thus avoiding the observer bias. And finally the total time for fiberscope to start from the incisors to the passing beyond the glottis is very much reduced in SPLIT when compared to conventional technique.[6]

The SPLIT can be compared to Tele laryngoscopy, which is used to visualize the vocal cords by the Ear, Nose and Throat surgeon. The Tele laryngoscope, in which visualizing camera is at an angle of 70° to its axis, will be advanced for visualizing the vocal cords.[7,8] Similarly, in the SPLIT also, after inserting the pre-determined length and then anti-flexing the fiber-optic tip to an appropriate angle, the glottis was visualized. This technique bypassed the possible difficulties in the upper airway so that the glottis was visualized more rapidly. We planned this study as crossover design to eliminate the influence of one technique over another. Hence, we analysed the participants who performed the conventional technique followed by the SPLIT and vice versa. The SPLIT could be adapted as a learning tool for fiber-optic intubation for novice anaesthesia which would help them to improve the learning curve and confidence in fiber-optic intubation.

The advantage of the SPLIT are, lesser risk of airway trauma and easy to perform even in hands of novice anaesthesiologists. Although there was a concern of trauma during the blind fiberscope insertion, practically there was no such trauma as fiberscope was introduced while the airway was kept wide open by lingual traction. Since the pre-determined length was measured from the patient itself and easy to perform, it can be done by anesthesiologists with limited experience in FOB. The operator bias was eliminated as all the time measurements were noted from the recorded video by a single observer. The use of the SPLIT could also be extended to the preoperative endoscopic airway examination.[9,10] Thus, the SPLIT can be an alternative to conventional technique.

CONCLUSION

Thus from this study it can be concluded that the use of SPLIT has profoundly lessened the timeto visualize the glottis and thereby the oral fiberoptic intubation than the conventional technique. Thus the SPLIT can be suggested as a preferred technique for the consultants and residents to manage the airway at the earliestand also can replace the conventional technique.

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